GUY'S HOSPITAL REPORTS.

EDITED BY

C. HILTON FAGGE, M.D.,

AND

ARTHUR E. DURHAM.

Third Series.

VOL. XVI.

LONDON:

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MDCCCLXXI.

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The St. Bartholomew's Hospital Reports.

The St. George's Hospital Reports.

The Liverpool Medical and Surgical Reports.

The London Hospital Reports.

The St. Thomas's Hospital Reports.

The Pharmaceutical Journal.

The Transactions of the Obstetrical Society of London.

American Journal of Medical Science (care of Messrs. Trübner and Co., 60, Paternoster Row, E.C.).

Annales de Dermatologie et de Syphiligraphie (care of M. le Dr. Doyon, 33, Rue de Jarente, Lyon, Rhône).

The Subscription List for Vol. XVII will be closed on the 1st of November, 1871.

STATISTICAL REPORT

TREATMENT OF SUBCLAVIAN ANEURISM.

By ALFRED POLAND.

THIS article is a continuation of the communication pub-
lished in the last volume of the 'Guy's Hospital Reports.'
It is by far the most important and practical section of our in-
vestigations, as dealing with the treatment of such a formidable
and fatal disease. In estimating the value of the several plans
proposed and adopted, we must necessarily pay particular atten-
tion to such evidence as is afforded us by bygone experience,
for this alone furnishes us with the only safe and material data
from which we are to obtain any guidance in our future
proceedings.

What are we to do with a subclavian aneurism? Such is the
object of the present communication. Every conceivable method
and device for the treatment of aneurism has been had recourse
to, sometimes attended with success, and sometimes with the
satisfaction of having retarded the progress of the disease, but
sometimes also ending in utter failure, nay, more, in hastening
the patient to a very speedy death. We have only to take a
cursory survey of the cases in the tables drawn up in the last
volume of these 'Reports,' where they are arranged according
to the treatment pursued, and revert to the column of
results, when we shall find most unsatisfactory terminations,
thus rendering it almost difficult to decide respecting the pro-

priety of any one method. Now, it is for this very purpose that we have undertaken an elaborate analysis and investigation of the treatment, so as to ascertain the causes of success which attended some, and the causes of failure which attended others; and, profiting by this experience, we may arrive at some proper conclusion as to what ought to be done in the matter. We have necessarily been obliged to recapitulate much that has been already detailed in the first part, but in statistical inquiries of the nature of the present kind this is absolutely unavoidable, and hence this communication has somewhat extended beyond the ordinary limits.

Before entering immediately upon the subject of treatment, let us for one moment take into consideration the question of *non-intervention*, that is to say, the leaving of a subclavian aneurism alone to nature's unaided efforts, in the hopes of obtaining a spontaneous coagulation in the sac, and a cure—or if this should not take place, of arresting the progress of the disease, so that it remains in a quiescent state. Such a mode of action on the part of the surgeon implies that he should stand by and leave the patient to the perils which so often attend aneurisms in the subclavian region, in a neighbourhood of a constantly moving bone, and in a situation greatly exposed to external influence. Although we shall allude to one or more cases of spontaneous cure, properly so called, we must bear in mind the sad and disastrous effects of non-intervention in Case 23, referred to at p. 146 of the 'Guy's Hospital Reports' (1869-70). Here was a man in the prime of life, aged 40, who in the month of October observed a small swelling in the subclavian region, which was at first mistaken for a glandular tumour, but which afterwards proved to be an aneurism; this did not long remain stationary, but increased rapidly to the size of a hen's egg, when it suddenly burst and was followed by an enormous effusion of blood into the tissues of the neck, extending as high as the chin and jaw, and passing over the median line, pressing upon the trachea and causing death in the month of February; thus the whole period, from the first discovery to the death, did not extend beyond five months.

It is not because several cases of spontaneous cure have most fortunately taken place, much to the surprise of the surgeon, that we are to expect a like result in others. Far from it, the

case above recited is a melancholy, but by no means a solitary, instance.

The cases in which no mechanical or surgical treatment whatever had been adopted have been already partially alluded to at pages 144 et seq., in the last volume of the 'Reports,' but these cases embrace two classes of a distinct character which we now shall consider separately, in order to arrive at a more definite conclusion as to the matter at issue.

The first category of cases comprises such as underwent no general or local medical treatment specially adopted in aneurism. The plan consists in leaving the aneurism to nature's efforts to obtain a spontaneous cure, but does not preclude ordinary measures for alleviating suffering, and attention to the general health and comfort of the patient.

The second category of cases includes those cases in which some specific mode of treatment was adopted, viz. general and local venesection, digitalis, antimony, low diet, &c., and the various local applications which tend to have a direct action on the aneurism itself.

SECTION I.—*On the expectant treatment of subclavian aneurism ; viz. spontaneous cures and failures properly so called.*

Under this heading we have twenty-two cases, of which there are four recoveries and eighteen deaths ; and in reviewing these cases we shall have to consider the probabilities of success in thus dealing with the disease, and we shall have to inquire, in case of failure in attaining so favorable a termination, what are the chances of the duration of the life of the patient under such circumstances ?—in other words, how long is a person affected with subclavian aneurism likely to survive, provided no specific medical or surgical interference is had recourse to ?

The four recoveries, or spontaneous cures, are Nos. 2, 3, 11, 12a.

The first two were diffused, and the other two were circumscribed.

They are well authenticated and undoubted cases of subclavian aneurism.

The cures may be attributed to spontaneous coagulation of

the blood in the sac, or to embolism, viz. to the sudden detachment of a clot and its impaction in the orifice of the aneurism, thus preventing further influx of blood from the main vessel into the aneurismal sac.

The following is an abstract of these four cures:

CASE 2. *Hodgson.*—A female, æt. 60, had a truly formidable aneurism, causing intense pain and anxiety, and attended with great emaciation. The disease was rapidly becoming aggravated, extending half way up the neck and also below the clavicle, the skin becoming livid, and the arm swollen with turgid veins; the patient was utterly unable to lie down in bed, in consequence of the sense of suffocation, and the disease was considered too advanced for any operation. After about forty-eight hours of more than usual suffering, and with pain so violent that she felt as if the shoulder was being torn from the body, the severity of the symptoms gradually abated; the tumour from this time began sensibly to diminish, and ultimately it receded to a small hard tumour.

What explanation can we give to this marvellous result? The only plausible one is that a clot had been detached, and had been caught in the orifice of communication of the artery with the aneurism, and thus forming a plug, cutting off the arterial current of blood into the sac and allowing self-coagulation inside the sac, the filling of it up, and the necessary after reparative results.

CASE 3. *Orpen.*—Was also probably a large diffused aneurism, which exerted much pressure on the brachial plexus, producing loss of power and diminished nutrition in the limb; here also the tumour, after enlarging rapidly and beating violently for some months, suddenly lost its pulsation, and gradually subsided into a small compact tumour.

CASE 11. *Porter.*—Was a subclavian aneurism of the left side, in a man, and several consultations were held as to the propriety of an operation. This was decided upon; but soon afterwards it was observed that the force of the pulsation became somewhat diminished, and from day to day the violence of the pulsation subsided, and the size of the tumour diminished, and he left the hospital well.

CASE 12a. *Gamgee.*—Male, æt. 48, is another example of the kind. The aneurism was on the left side, was very large, and threatening to rupture; under rest and moderately nourishing diet solidification began to take place, and gradually progressed to the obliteration of the tumour. This patient, however, subsequently had a similar aneurism on the opposite side, but which was subjected to treatment; the patient died from the bursting of an aortic aneurism into the left bronchus, *about four years after the cure of the first aneurism.*

On examining the site of the cured aneurism the left carotid was found normal, and the left subclavian, immediately after giving off the vertebral artery (which was pervious) was occluded and imbedded in a mass of fibrous tissue, in which it was impossible to recognise the artery, and the vessel could only be distinctly seen an inch beyond the lower border of the first rib.

Let us now turn to the converse side and take into consideration the deaths recorded after the non-intervention plan, paying particular attention to the duration of the life of the patient, the mode of death, and the reparative process, if any, in the sac or vessel, to check or limit the disease.

Although we shall have to allude to eighteen cases, some of these are deficient in detail, both as to the duration of the disease and other points; still, we will consider them separately, and under the ollowing order:

The first set of cases, viz. *where the duration of the disease is not strictly definite,* comprise six in number, Cases 5, 6, 9, 10, 12, 24.

In Case 5 there was no history; the aneurism burst externally, and the sac only was examined.

In Case 6 the patient died of a ruptured popliteal aneurism, but there was extensive atheromatous disease in the arterial system generally.

Case 9 is a simple fusiform dilatation of the artery, whether natural or acquired it is impossible to say; at all events, it led to no inconvenience, and the patient died of bronchitis and typhoid fever.

Case 10.—The history incomplete, but death was the result of the aneurism, and there was atheromatous disease. Ligature of first portion of subclavian artery was strongly urged, but declined.

Case 12.—Incomplete history, the preparation only is fully described ; the patient died suddenly, but the cause not ascertained.

Case 24.—Similar to Case 6. The patient died of diffused popliteal aneurism, &c., the subclavian aneurism remaining quiescent.

We subjoin a short abstract of these several cases.

CASE 5. *Burton.*—Although no history was attached to this case, yet the examination of the parts after death was highly interesting. The patient was a male, æt. 46, and was admitted into the hospital with a very large diffused aneurism on the left side. He died twelve weeks afterwards from the bursting of the aneurism externally. The preparation is in the St. Thomas's Hospital Museum.

The subclavian artery, from *its origin to the external border of the scalenus,* was healthy, but from this point to the axillary it was dilated into an aneurism, which had become very large and sacculated, and capable of holding five or six pints. The cardiac or proximal end of the artery at the aneurism had only a small aperture, and the distal end was closed ; the axillary artery for about an

inch below the sac was flattened, and the opposed surfaces of the lining membrane covered with adherent lymph.

Here then were two reparative processes going on—one, already completed, being the closure of the distal end, and thus preventing any further influx of blood from that side, and was strictly a process which one wishes to imitate by the Brasdor operation; the other, the commencing closure of the cardiac end, but too late to prevent the disastrous occurrence. The distal end had probably been closed some time, so that the blood propelled directly from the aorta through the subclavian into the sac could not escape, but gradually enlarged the sac until it gave way by force of the pressure of the blood; if the cardiac end could only have been secured and the supply of blood cut off, a favorable result might have been anticipated. The patient was only forty-six years of age, and the artery was found perfectly healthy. Again, the case rather goes against the Brasdor operation; here it was completed most satisfactorily, and yet with no beneficial results towards the cure of the aneurism.

CASE 10.   *Colles.*—Here, also, the report merely states that there was a spontaneous aneurism on the right side in a man æt. 55. When first seen it was the size of a pullet's egg, and ligature of the first portion of the subclavian artery strongly urged, but refused. The aneurism afterwards became diffused, and he lingered for some months; he appeared to die, not from hæmorrhage, but rather from suppuration and long-continued irritation from three large ulcers a little below and before the axilla. The large arteries were not all dilated, but some very small opaque spots were visible on their internal coats. The trunk of the subclavian artery was of natural size and texture for an inch beyond the origin of the vertebral, when it became dilated to the breadth of an inch, and then ran over the front of the tumour. Here its coats became so thin that it was impossible to distinguish it from the sac. The condition of the aneurism is not mentioned, but it is stated that the articulation of the shoulder communicated with the aneurismal tumour.

CASE 12.   *Porter.*—In the winter of 1839-40 a case of right subclavian aneurism occurred in the Meath Hospital, in which the patient died suddenly previous to the performance of an operation. He was a huntsman, and the disease was supposed to have been produced by inordinate exercise of the right arm.

The subclavian artery appeared to have been the seat of fusiform dilatation in two places, one immediately as the vessel was passing over the first rib, and the other a little lower down. From the posterior part of the superior dilatation an aneurismal sac was formed, which passed downwards, pressing upon the pleura, and backwards as far as the transverse processes of the cervical vertebræ. The

particular relation of the sac to the artery was never discovered during life, and had an attempt been made to include the vessel in a ligature at the ordinary situation outside the scalenus the aneurism needle must of necessity have been pushed through the sac. Both dilatations were strongly adherent to the vein, so as with difficulty to be separated without laceration.

Both the fusiform dilatations of the artery seemed to be satisfactory specimens of the pathological condition of the vessel, the superior one showing the effects of a condition antecedent to the formation of a circumscribed aneurism.

CASE 24. Quoted by *Norris.*—This was one of multiple aneurism in a male, æt. 55, the patient dying from the effects of a burst popliteal aneurism. The subclavian sac was of the size of a hen's egg, and of seven months' duration. The condition of the arterial system in the neighbourhood thereof would have seriously interfered with any operative measures, should they have been undertaken. The arch of the aorta, and all the branches arising from it, were considerably dilated and their coats thickened; there was also a large aneurism in the course of the axillary artery on the same side; immediately below this was another small dilatation in the brachial artery.

CASE 6. *Walton.*—A very similar case, in a male, æt. 66, of multiple aneurism, where the patient also died from the effects of a burst popliteal aneurism. The subclavian aneurism was large, and commenced at the arteria innominata, and involved all the branches of the subclavian, so as to render it impossible to trace them. There was considerable fibrinous deposit in the pouches, corresponding to the origin of these branches. Extensive atheromatous disease in the femoral vessel.

CASE 9 *Dr. Adams.*—Labourer, æt. 55. This is a questionable case of aneurism in the true sense of the word; it was more of a local and circumscribed dilatation of the artery, and noticed casually two and a half years, and it is doubtful whether it was congenital or acquired. A pulsating tumour in the left supra-clavicular region was accidentally discovered, and the only account the man could give was that a few weeks before admission he noticed a beating above the centre of the left clavicle, but there was no swelling or pain. On careful examination there projected a pulsating tumour, not very prominent, but of an ovoid shape and transverse in its direction; it became more manifest when the shoulder was depressed; the integuments over it were natural in appearance. Pressure on the artery at the outer margin of the scalenus muscle stopped all pulsation in the swelling, as well as in the radial artery. It was considered to be a fusiform dilatation of the left subclavian artery in its third stage. There was no aneurismal swelling in the artery on the right side. It was not deemed necessary to employ any treatment. This fusiform swelling of the left subclavian artery never seemed to undergo any change up to the period of his death, three years after its first discovery, from an attack of typhoid pneumonia.

The inspection of the structures confirmed the diagnosis. The dilatation of the artery occupied three inches of its course; the increase in the calibre commenced at a point about half an inch external to the outer border of the scalenus, and gradually dilated to the extent of two and a half inches, then became somewhat diminished as it became axillary. The ovoid swelling was the size of a pigeon's egg; the lining membrane, as well as the middle and external coats, was per-

fectly healthy; the tunics did not appear to be atrophied or hypertrophied, neither did the dilated portion of the vessel in any part of its course contain coagula.

Strict examination was made as to the condition of all the other parts of the circulatory system, and all those structures were found sound.

There was no atheromatous degeneration of the internal coat, nor thickening of the middle or external coat.[1]

Was this dilatation an early stage of aneurism? And if so, would it have ultimately led to a real aneurism, and undergone all those changes and risks of rupture usually associated with that disease, or was it rather an abnormal local dilatation of the vessel, quite independent of disease? At all events, it was best left alone.

The second set of cases comprises those in which the duration of life is more or less accurately defined:—12 cases, Nos. 1, 4, 7, 8, 13, 14, 15, 16, 18, 19, 21, 23.

Post-mortem examinations were made in all of the above except Case 14. Of the 10 examined, 6 had atheroma (Nos. 7, 8, 18, 19, 21, 23). Four had a dilated aorta or artery (Nos. 1, 4, 16, and 13).

Natural distal occlusion occurred in Cases 19, 21, but without producing any changes towards the prevention of the extension of the aneurism. These cases will be referred to when considering the subject of distal operations in subclavian aneurisms.

We shall here give a brief outline of these twelve cases.

CASE 13. *Vacca Berlinghieri.*—This case is in many respects doubtful; it is extremely probable that, in the first instance, the aneurisms were merely local dilatations of the artery, as in Case 9, and had remained in this condition until a few years before the patient came under special notice, when the aneurisms were fully recognised, and subsequently proved to be such at the examination of the parts. The following is an abstract of the case :—A man, æt. 60, for twenty-four years had a small pulsating tumour on both sides of the upper part of the chest, exactly in the course of the subclavian and axillary arteries, those vessels being dilated from the scalenus outwards towards the region of the neck of the humerus. The swelling on the right side was cylindrical, and of the size of a small hen's egg, and subsided on the least pressure. The left swelling was much larger, and of irregular shape. Such is the meagre history and account given; there is no mention of the cause of death, and no light thrown upon the case, except the confirmation of the facts by the post-mortem examination. On viewing the body externally the swelling on the right side was scarcely perceptible, although during life it formed a pretty large tumour; on the left side the swelling was quite as prominent as during life. After raising the clavicle and isolating the vessels from the surrounding parts, it was observed on the right side that the artery, in its passage

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[1] This case is fully recorded in the 'Med.-Chir. Trans.,' 1869, p. 288.

between the scaleni, preserved its normal width, but became enlarged on approaching the lower border of the first rib, and was here uniformly dilated. At this spot the cylindrical swelling became interrupted by a circular contraction, and immediately after this the artery again became dilated, and continued so until it reached the neck of the humerus, where it resumed its natural dimensions. On the left side the vessel was more enlarged than that on the right, and had a similar circular contraction at the same spot, opposite the lower margin of the first rib. On the anterior part of the dilated portion of the artery between this contraction, and the aneurismal sac, there were found three openings in the vessel, each of the size of a quill. On laying open the whole of the dilated vessel that portion above the contraction had the coats intact; but in the portion below, at the posterior part, was a fourth opening, much larger than the others, which also communicated with the aneurismal sac.

Both these diseased changes in the left artery below the contraction lay in such a manner that they could not be recognised by the sight or touch, and the difference between the two could not be discovered. But the cylindrical form of the smaller swelling on the right side, and its subsidence under pressure, showed morbid dilatation only; whereas that on the left formed an irregular swelling, was hard, and did not subside on pressure, and proved to be an aneurism through giving way of the artery.

The details of the post-mortem leave no doubt as to the evidence of aneurism upon the left side affecting the confines of the subclavian and first portion of the axillary artery, with dilatation of the third portion of the subclavian; that on the right appears to have been rather more than a simple dilated artery, inasmuch as there were two distinct enlargements in the vessel, separated by a narrowing of the tube, and hardly to be considered as a natural defective condition.

CASE 14. *Guattani.*—Male, æt. 47. Here the aneurism was recorded as being of *eight years'* duration, and was of the size of a pigeon's egg; but the evidence rests upon the man's own statement only, he attributing it to forcible struggling when thirty-nine years of age. However, when admitted into the hospital his case was deemed hopeless, probably from the aneurism having become diffused, and he died shortly after from asphyxia. There was no post-mortem.

CASE 7. *Ogle.*—Male, æt. 50, *lived two years and eight months* after its discovery. Although the history is somewhat obscure as to the date of origin, which the patient traced back to a strain two years before he came under notice, still we may presume it to be correct, as when seen the aneurism was of moderate size, and increased rapidly, so that it became diffused to a very great extent. He lived on for eight months, when it burst externally and caused death by hæmorrhage in twenty-four hours. He had two losses of blood, the first a pint and a half of bright red blood, and the second just before death. The right subclavian artery generally was very dilated, and, along with the arch of the aorta, was the seat of several patches of atheromatous deposit. The aneurismal sac occupied

a large extent of surface, and was capable of holding several pints of blood. About half of the contents was coagulum, but none very discoloured.

The dried preparation is in the St. George's Hospital Museum (Series VI, No. 137). The condition of the subclavian artery, as revealed after death, would have precluded all attempts at operation proving successful.

CASE 19. *Auchinloss.*—Male, æt. 64, *lived two years and five months.* It remained the size of a Spanish nut for a year and a half, when it increased to double the size, and in three months reached the size of a goose's egg, and soon became half as large as a child's head at birth. It now rapidly increased, and threatened to burst externally, when he died suddenly.

The examination of the parts showed that pressure had been exerted on the subclavian artery on the distal side of the aneurism by the overlapping of the aneurism over the edges of the scaleni muscles, and thus causing the inner surfaces of the artery to be kept in contact, whereby the artery became obliterated and consolidated. This is another instance of failure by cutting off the distal communication in the cure of aneurism, as in Brasdor's operation. The whole case is exceedingly interesting. We have thought fit to subjoin a short abstract.

CASE 19. *Auchinloss.*—Is an instance of natural pressure on and obliteration of the subclavian artery on the distal side of an aneurism involving the subclavian, carotid, and innominate arteries. During life there was at the lower and anterior part of the neck, immediately behind the right sterno-clavicular articulation, a strong pulsating tumour, of a special shape, and somewhat larger than an ordinary hen's egg. It extended in the course of the carotid artery and of the subclavian to the inner edge of the scaleni muscles, these two vessels with the innominata being involved in the affection. The subclavian artery seemed to be obliterated in the middle division of its course, as it passes between the scaleni, there being no pulsation perceptible on the acromial side of these muscles, in the axilla, nor anywhere down the arm. In other respects, however, the extremity felt natural, though affected with a slight numbness and frequent shooting pains. The tumour was rather firm, slightly painful to pressure, but not discoloured. A consultation was held with the object to determine whether or not it would be expedient to recommend any operation, viz. either that of applying a ligature to the innominata, between the seat of the disease and aorta, or tying the carotid on the distal side of the tumour. It appeared from the history of the case that the disease had commenced near the origin either of the subclavian or the carotid, if not at the bifurcation of the innominata itself, and that subsequently it had extended inwards towards the chest, as well as outwards along the neck. The uncertainty of the extent of the disease in the innominata, therefore, was quite sufficient to preclude the propriety of tying that vessel. The other operation was considered too doubtful and dangerous an expedient to be had recourse to. Such an operation, it is generally allowed, is fully more likely to be productive of bad than of good effects, particularly when the disease is so near to the heart and innominata. The patient was, in consequence, dissuaded from any operation, with injunctions to live low and to abstain from much exercise. The disease, at this time, was of fourteen months' standing, the patient's age sixty-four, and he seemed healthy. He left for the country. The aneurism slowly and gradually

increased, when it burst and became diffused, and was threatening to give way externally at several points, when he died suddenly, fifteen months after the debate about an operation, and two years and five months after the first commencement of the disease.

Post-mortem examination revealed an aneurism involving the upper two thirds of the innominate, the whole length of the carotid and the right subclavian to the inner edge of the scaleni; the two latter vessels were dilated in their whole circumference, and were about twice the size of a thumb and quite circular. The subclavian was obliterated to the extent of the breadth of the scaleni, where it was so completely incorporated with these muscles as to form apparently one structure. This obliteration and consolidation was occasioned by the aneurism overlapping the edge of these muscles, so as to keep the inner surface of the vessel constantly in contact. The canal of the subclavian artery was quite pervious on the outer side of the scalenus, showing that the blood had regained the original main trunk. The aneurismal sac contained a large quantity of fluid blood, and immediately after death the whole cyst subsided, as if a rupture had taken place internally ; but this was not the case, and the circumstance explained by the fluid contents of the sac receding towards the aorta and from it readily passing into the large vessels of the chest and abdomen.

The scaleni muscles acting as a compressing cause in obliterating the artery when passing between them, by the overlapping of an aneurism, is also exemplified in Case 31, but in this instance the aneurism was on the distal side, and underwent a spontaneous cure through this means. (See Compression, further on.)

Two cases *lived two years ;* both were males, æt. 45; the aneurisms were on the right side and both became diffused, under which condition they were first seen. The following are the particulars :

CASE 1. *Boucher.*—The aneurism appeared not to have given way until recently, when it rapidly attained an enormous size, the skin over it becoming discoloured, black and livid, and death taking place from exhaustion before the aneurism gave way externally. On examination the aneurism was found to involve the whole of the subclavian, from its origin near the carotid as far as to the axillary, and seemed to be a dilatation of the whole artery. The sac was very large and contained chiefly fluid blood; some large clots were adherent to its walls. The right lung was adherent to the sac.

There was no chance for any operation, except in the early stage, and then it would have been a question of ligature of the innominate or of the carotid.

CASE 8. *Holmes.*—The aneurism became very large and diffused six months after the first notice of the disease, and it remained much in the same state for a year and a half; he could bear no pressure, and all operative measures were considered out of the question. He died of dyspnœa. The dilatation commenced near the aortic valves, and involved the whole arch, as also the innominata and the whole length of the subclavian, and terminated by a rounded extremity just beyond the first rib into the axillary artery, which was healthy, as also was the right carotid

artery. The sac of the subclavian portion of the aneurism was half full of laminated clot, but there was a free passage for the circulation through the entire vessel. The affected arteries were atheromatous. Here ligature of the carotid was the only operation left open, but there was extensive disease of the arch and of the innominata.

Three cases *lived about a year and a half.*

Cases 15 and 16 are related by Van Swieten, both were males, and the ages not stated; and the cases are very irregularly detailed, the causes somewhat peculiar, and the mode of death not accurately defined.

CASE 15.—The aneurism arose from a most violent blow on the right breast, followed by acute pain in the upper part of the chest, and some months after by an inordinate pulsation under the right clavicle, which increased, and caused shortness of breath. He lingered on for a year and died suddenly. On examination the right subclavian artery was dilated into a large sac, and had become thinned like a sheet of paper, and through it could be seen the blood contents; by a slight wound inflicted much concrete blood escaped.

CASE 16.—In hunting, a man suddenly turned his head to the right side, and not without great difficulty could he return it to the natural site; from that moment he was always languid, and had much difficulty in deglutition and respiration. After the lapse of fifteen months he died. On examination, the aorta was found much enlarged, and there was a large aneurismal sac of the right subclavian artery.

CASE 18.   *Guthrie.*—A man, æt. 53, had right subclavian aneurism, for which in the early stage, when small and of only three months' duration, he was in the London Hospital, and was strongly urged to submit to an operation, but this he refused to do. The tumour steadily increased, and at the end of a year it was as large as a 48-lb. shot; the man was now anxious to have something done, but it was too late, and shortly afterwards he had an attack of hæmoptysis and died three weeks after admission into the hospital, the aneurism having burst into the lungs.

The arch of the aorta was preternaturally dilated; the right subclavian artery was sound for half an inch after it had passed the outer edge of the scalenus, when it became slightly dilated and here the aneurism commenced, which latter extended one and a half inch into the axilla; the brachial artery below the tumour was smaller than natural. The aneurism had forced its way into the chest by removal of the first five ribs, and became united to the upper lobe of the lung and had finally opened into it. It had also pushed the clavicle up and a portion of the subclavian artery, which was immediately behind the upper part of the sac.

Here in the early stage ligature of the third portion close to the scalenus might have been useful, and with every chance of success, as occurred in Cases Nos. 76 and 80. The case itself bears great analogy to Case 80 in many respects.

One case lived *eight and a half months.*

CASE 4. *Neret.*—A beggar, æt. 38, who had for eight months noticed above and behind the left clavicle a tumour of the size of a large chesnut, which pulsated, and which gave him much pain when carrying his knapsack, the strap of which passed over it. He had latterly spat up blood, and had had a severe cough for eight years. He was admitted for hæmoptysis and died in sixteen days from the effects of the bursting of the aneurism into the lung.

The aneurism involved the subclavian from its origin from the arch to the space between the scaleni; the inferior portion of the sac was destroyed and adherent to the apex of the lung, forming a direct communication with the corresponding bronchus. The sac formed a vast cavity, capable of containing a fœtal head, and had in its interior thick layers of concrete fibrine.

It is questionable whether a distal operation would have been of any service, if we take Cases 19 and 21 as a guide.

One case *lived five and a half months*, viz. :—

CASE 21. *Clivier.*—The man, æt. 60, was admitted into the hospital for epilepsy, and was bled several times, when there was accidentally discovered a right subclavian aneurism of the size of a hen's egg, which the patient stated was of five months' duration. However, soon after this discovery, the aneurism gave way and became enormously diffused, and he died fifteen days after this occurrence in a state of coma from exhaustion. The aneurism was found to be composed of three portions—a supra-clavicular, reaching as high as the jaw; a second, passing under the clavicle towards the axilla; and a third, occupying the upper part of the thoracic region. The tumour was filled with blood-clots, which were disposed in several superimposed layers, especially about its centre. Opposite the opening of the artery into the aneurism was a kind of infundibulum containing liquid and grumous blood, scarcely solidified. The right subclavian artery with the innominata was enlarged; this dilatation ceased abruptly to a very small extent, and then the whole remainder of the subclavian seemed to be entirely replaced by the aneurism. The subclavian on the distal side of the sac was obliterated, as also all the collateral branches at their origin; there was complete obliteration of the right common carotid, as also that of the left carotid. The left subclavian was the only permeable trunk from the arch of the aorta. Much atheromatous disease of the arterial system.

Here then we have another very interesting example of the failure of distal occlusion in preventing the increase of an aneurism.

One case *lived five months.*

Case 23, *Krackowitzer.*—M——, æt. 40, fully described at page 146 of the last volume of these 'Reports.' The examination of the parts after death is not very accurately described.

The aneurism itself only occupied a short space of the artery, about three quarters of an inch, close to its origin from the innominate, and was of the size of a hen's egg; from its posterior part the continuation of the artery passed off. The sac had burst, and the blood escaping formed the large diffused aneurism in

the neck. The integument was of normal size, but its state was somewhat thickened and irregularly hard from patches of atheroma imbedded in their structure. The same degeneration was observed in the right axilla. The aorta was also atheromatous.

This case in its early state, before the bursting of the aneurism, would have involved much difficulty as to the line of treatment to be pursued; ligature of the innominata would surely have proved fatal in its diseased condition; rest, medicinal and local measures, might have stayed and prevented the rapid result.

SECTION II.—*On the medical or general treatment specially advocated in aneurism, comprising that known as the "Valsalva" method.*

This has been more especially had recourse to in cases of subclavian aneurism.

The object of the treatment consists in adopting measures towards effecting a cure by means of internal and external remedies quite independently of mechanical or surgical interference.

The treatment is generally termed the Valsalva method, where general and local bleeding, with low diet, is mainly had recourse to, but otherwise it consists in rest, the internal exhibition of digitalis, antimony, purgatives, &c., the local application of ice, vinegar, astringents, solutions of lead, &c.; in fact, the use of such means as tend to diminish the flow of blood into the tumour, and to favour coagulation of the contents of the aneurismal sac, by lowering the heart's action and force of the arterial current. But, unfortunately, this method necessarily entails great diminution of the vital powers, even bringing the patient to the verge of death's door, and often cuts off the very means for repair after coagulation has been partly effected. The treatment, we shall find, has been resorted to as a preparatory measure to operative proceedings, but with what success, good or ill, we shall see further on. (See Cases 68, 82, 83, 85, 87, 88, 95, 96, 102, 104, 114.)

The comparatively small number of cases of subclavian aneurism which have been placed upon record as having undergone this treatment offers us little or no means of forming any conclusive deductions, and, therefore, these must be received

with caution, for there is no doubt that many deaths have been brought about by this method which have never been recorded.

We have been able to collect thirteen examples where the above treatment has been carried out, with general and local depletion, in a more or less decided manner after the Valsalva views.

Of these 13 cases, 7 are reported as cured, viz. 4 circumscribed and 3 diffused aneurisms.

1 relieved, diffused aneurism.

5 terminated in death, viz. 1 circumscribed and 4 diffused aneurisms.

The 7 cases of recovery, or in process of cure or stated to be cured, are Cases 37, 37a, 38, 39, 41, 42, 43, and the following brief abstract of these cases are here inserted.

CASE 37. *Guérin père.*—M—, age not stated, was admitted into the hospital at Bordeaux in August, 1790, and the case was published in the year 1797 in a memoir read at the Soc. de Santé de Paris, and published in their periodical, vol. i, p. 203 (' Recueil périodique '). The patient was an athletic carter, who had a right subclavian aneurism of the size of a hen's egg, but which became diffused and of enormous size, occupying the whole of the side of the neck extending upwards to the jaw and downwards towards the ribs; it caused pressure on the trachea, and threatened suffocation. The skin over it was red, and threatened to burst. The treatment extended over a period of three months; he was bled several times, kept at perfect rest and on strict diet; locally were applied compresses soaked in saturnine lotion, and cold. The swelling diminished to a small tumour, and with feeble pulsation. When he left the hospital it was found that in the situation of the aneurism there only remained a firm and insensible tumour of the size of a small egg; the patient experienced some little difficulty in the movement of the arm. This case was seen two years afterwards, and the parts had remained in the same state, and he was able to work in the harbour as a carter.

CASE 37A. *Guérin fils.*—Recorded by Roux, who states that on his visit to the hospital at Bordeaux, during the early months of 1812, Boyer and himself saw a male patient who had almost undergone a cure of aneurism, which, on account of its situation and enormous development, was considered incurable, and necessarily mortal. "At the time we saw the tumour it was limited to the inferior part of the neck; it was more elastic than soft and fluctuating, and had a feeble pulsation in it; the clavicle was destroyed about its middle to a certain extent. We never learnt the result of the case." The treatment had been cold and astringent applications, moderate Valsalva method, rest, and strict diet; the tumour had been of enormous size, but had gradually diminished to the small size when seen by Roux; it was evidently in the process of cure, and the patient was able to go about, and had lost the previous sense of suffocation.

These two cases in their details and results are so very similar,

occurring at the hospital at Bordeaux under the care of Guérin père et fils, that a question might be raised as to their being one and the same case; for in both instances the ages are not stated, in both the aneurism was on the right side and had become diffused, occupying the side of the neck to a considerable extent, and causing pressure on the trachea; moreover, they were both treated in the same manner, cold and astringent applications and a moderate Valsalva method; in both the progress of the disease was arrested, and the aneurism began to diminish with relief to all the urgent symptoms. In the first case, however, there was a complete cure, and it was seen two years afterwards so as to confirm the result; but there is no mention made of the destruction of the clavicle,[1] and this could not very well have been destroyed, since the man was able to follow his employment as a carter. This case also was published full fifteen years before Roux saw the second case, which is conclusive as to their being distinct and separate cases. Moreover, he states that the latter one had never been published, and that there was destruction of the middle of the clavicle.

Roux further remarks that at his visit M. Guérin père was still living, and he saw both him and his son. He says, " Our confrères were not ignorant that the treatment of aneurism by refrigerants or astringent applications did not receive great favour at Paris. Guérin père especially had not forgotten, and did not fail to remind us of, the sharp and long debate which he had to sustain on this point of surgical therapeutics with M. Deschamps. M. Guérin regarded ice, refrigerants, and astringents, as useful only when the aneurism had become diffused and was near the surface; he considered the success of his case to be entirely due to the applications, and not to the venesection.

CASES 41 and 42. *Lancisi.*—Both cases are stated to be circumscribed aneurisms on the left side, both had had syphilis, and both were subjected to the Valsalva method, combined with an antisyphilitic treatment, and both were cured and seen six years afterwards, when there was no return of the disease.

At first sight these cases appear to be one and the same, but on referring to the original work each case is separately and accurately described in a distinct paragraph, the one occurring in a fishmonger aged forty-five, and the other in a player on the

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[1] In the table at page 61 of the last number of the ' Reports,' this case is erroneously recorded as having had destruction of the clavicle.

harp, whose age is not stated. Another question is also raised respecting these cases, viz. as to the reality of their being aneurisms at all, or simply enlarged glands seated over the subclavian artery, of a syphilitic nature, and which disappeared under the antisyphilitic treatment. However, the cases are generally quoted and received as aneurisms, and have, therefore, been included in the present collection.

CASE 47. *Lloyd.*—Male, æt. 42, cannot be taken for much account; it was one of diffused aneurism, and treated by vene-section, digitalis, and rest; but although he was somewhat im-proved in health, and had some diminution in the tumour, yet he was only under treatment a month, left the hospital and was afterwards lost sight of. In this case the aneurism was very large, of the size of a child's head, and occupied chiefly the axilla, although described as subclavian. Ligature of the artery was proposed, but the patient was considered too weak to un-dergo the operation.

CASE 39. *Cloquet* and *Bernardin.*—Male, æt. 50. (Details, see p. 115, 'Guy's Hospital Reports,' 1869-70.) Was a circumscribed aneurism, and considered to be a very favorable case for operation, but the patient steadily refused any surgical interference. For-tunately for him, the aneurism underwent a complete spontaneous cure under the treatment adopted for a severe attack of acute inflammation of the bowels, where rest, strict diet, antiphlo-gistics—in fact, a modified form of the Valsalva treatment—was carried out. The limb, however, became wasted, with loss of motion in the arm, probably from injury done to the nerves by the pressure of the aneurism.

CASE 43. *Pancoast.*—Male, æt. 39. Is also another genuine instance of spontaneous cure, the details of which are given at p. 145 of the last volume. The Valsalva treatment, first adopted, failing, he was carried into the theatre to have a liga-ture put upon the artery, when he became so collapsed that the operation had to be deferred; he recovered from this state, and from that moment the aneurism began to undergo a spontaneous cure, which was rapidly effected in a very short time. It was ascertained that the man had accidentally swallowed a poisonous dose of tincture of aconite just previous to the intended opera-tion, instead of a dose of opium. Was it the collapsed condition which induced coagulation of the contents of the sac and due to

the aconite? or was it a sudden embolism set up by manipulation in carrying him into the theatre, and resembling the effects produced in one of Fergusson's cases of manipulation?

CASE 38. *Yeatman.*—Male, æt. 37. Is an instance where an aneurism, at first circumscribed, but afterwards becoming diffused, was effectually cured after undergoing the Valsalva treatment, carried out in moderation and over a period of a year and a half; this plan was also combined with the use of direct compression, which, no doubt, materially assisted in the slow but undoubted success which followed. The treatment of this case we shall quote in full; it confirms the views of the advocates of this method, and offers a striking resemblance to Pelletan's celebrated one, which is so often quoted. We might have included Pelletan's case in our series, as it was one essentially subclavio-axillary, but it has generally been considered to be axillary, and quoted as such. We shall give a brief outline of his case also after that of Yeatman's.

Yeatman's case.—A robust healthy man, æt. 37, of calm and firm mind, noticed a tumour of the size of a large nutmeg above the left clavicle, about three months before the present observation, but did not think it of consequence. (For further detail of previous history, see 'Guy's Hospital Reports,' 1869-70, p. 115.)

February 20th, 1813.—The tumour, which appears to be of the size and shape of a pullet's egg, lies at the left side and root of the neck, just above the superior edge of the clavicle, and within an inch and a half of the sternal end of the bone, with its apex touching the edge of the outer border of the sterno-mastoid muscle, its base low down between the anterior and middle scaleni muscles, and its superior and external surface directly beneath the fibres of the platysma. The tip of the little finger may be insinuated between the clavicle and inferior side of the tumour. The tumour presents an even surface, feels elastic, but a small quantity of its contents only can be forced into the artery.

It may be seen to pulsate from the opposite part of the room, and is attended with the tremulous motion and the hissing noise so characteristic of aneurism. These peculiarities are more strikingly observed immediately below the subclavian muscle and under the inferior fibres of the pectoralis major muscle, along the course of the subclavian artery towards the axilla and beyond the aneurismal sac. The patient feels some pain in the tumour when he coughs; is indolent and sleepy; complains still of the tingling sensation in the fingers and numbness in the forearm, and more especially when he walks, and hangs his arm by his side. In all other respects he is well. The aneurism was of three months' duration.

22nd.—Bled to two pints. To take a grain of digitalis three times a day. Low diet.

29th.—Bled to two pints. Continue digitalis.

March 12th.—Pulse 80, and not so full; otherwise no alteration. Bled to two pints. Continue digitalis. Ext. Coloc. gr. x, Cal. gr. iij, occasionally.

28th.—Soreness over the tumour. No alteration. Bled to 24 oz.

April 5th.—Pulse 75, more compressible. The digitalis and bleedings, however, have not produced that sensible effect on the circulation and constitution which might have been expected. Bled to two pints. Repeat digitalis.

May 13th.—Pulse 60, slightly irregular and easily yielding to pressure. Patient reduced in flesh and much weakened. Omit the digitalis, but continue the cathartic occasionally. The circulation being now favorable to the obliteration of the opening into the aneurismal sac by the judicious application of pressure, I embraced the first opportunity of making that trial (see " Compression" further on).

30th.—Pulse 70. Tumour rather sore, skin hot. Bled to 20 oz.; to take 1 gr. of digitalis, with 10 gr. of Pot. Nit. t. d.; six leeches to tumour.

June 25th.—Soreness abated; no alteration in tumour. Pulse 55. Continue.

30th.—Pulse 48 and intermitting. Nausea and great debility; perspires much. Omit digitalis.

August 14th.—Pulse 75 and full. The tumour is rather larger; complains of strong beating on the right side of the neck and left breast, and in the course of the subclavian artery beyond the tumour. Bled to 24 oz.; felt extremely languid and fainted immediately after this bleeding. Has repeated the application of the leeches twice a week ever since the 30th of May. He says these remove the fulness of the parts.

21st.—Felt a dull pain and numbness about the scapula and axilla, in addition to the same sensations in the arm of the affected side; pulse stronger; slight heat and thirst, with furred tongue. Bled to 10 oz.; repeat the digitalis; to take ʒiss of Magn. Sulph. in water every morning.

29th.—Increased action of the vessels; heat and thirst, &c., abated.

September 8th.—Pulse 47 and languid; he is greatly reduced in flesh and strength; perspires profusely; headache. Omit digitalis, &c. The pressure has been gradually increased, but without producing any apparent good.

16th.—Pulse 60 and regular; no headache or profuse perspirations; the tumour appears larger.

22nd.—No further alteration. Repeat the leeches and cathartic pills.

25th.—Pulse 76 and full. Pain again in the shoulder and breast of the affected side; acquired strength and flesh. Bled to 24 oz.; repeat leeches, pills, and digitalis.

30th.—Pulse 57. Tumour enlarges; the superincumbent skin somewhat turgid. I discovered the whizzing noise in the right carotid. He says the leeches remove the soreness and fulness in and about the tumour. Continue.

October 15th.—Patient's strength and flesh much reduced; pulse 28 and weak, but regular; slight headache and nausea. Omit the digitalis, &c.

November 12th.—The tumour has been increasing since September 16th, is about the size and shape of a half-pint breakfast-cup, has risen one inch above the anterior surface of clavicle, and has raised that bone somewhat out of its natural situation. Pulse in the left wrist affected by the tumour, being weaker and more irregular than in the other arm; temperature of both extremities the same. Repeat leeches and the saline purgatives.

December 5th.—Tumour still larger. He feels more restless at night, and more

pain and numbness in the shoulder and forearm   Repeat the digitalis and continue the other remedies.

January 1st, 1814.—Tumour stationary as to size. From this time the case went on without any particular alteration, the remedies being occasionally employed as the circulation required them, till April 15th, when the tumour did not pulsate so strongly ; it had become tenser, and the pains in the shoulder, &c., had ceased. The superincumbent skin is movable, and of its natural colour.

May 10th.—No alteration. Continue the digitalis, increase the pressure, and repeat the leeches and pills.

June 1st.—Tumour less and remarkably tense; pulsation scarcely perceptible; the tremulous motion and hissing noise not discoverable; no pain or soreness in or about the tumour; has the perfect use of the arm, without the numbness and the tingling sensation in the fingers, which he has more or less complained of from the commencement; feels no pressure against the clavicle, but now and then a tingling and sense of heat about the scapula; pulse 78, regular. The digitalis seems to have lost its effects in a great measure, the patient taking it for a much longer time than usual without being so sensibly affected. Continue digitalis, leeches, and pressure. The bowels have been constantly kept in a regular state by the alternate use of the drastic and saline purgatives. Bled to 14 oz.

8th.—No pulsation in the tumour, and it is rather less in size. Continue remedies.

July 4th.—Pulse 67 and full; tumour lessens. Omit digitalis. Bled to 16 oz.

August 10th.—Pulse regular; tumour diminishes slowly. Bled to 14 oz.

September 5th.—General health tolerably good; has regained some strength and flesh; pulse natural; tumour gradually lessens. Continue the pressure, leeches, and Pil. Cal. c. Col.

October 1st.—Bled to 14 oz. Continue. From this time tumour rapidly diminished, and in the latter end of December no trace of it was to be discovered.

Thus, the depleting and sedative plan of treatment was persisted in for more than a year and a half. The arm recovered its wonted power, and the body its former strength and plumpness.

Yeatman's remarks.—" I believe that the large bleedings so often repeated, and the sedative plan so actively and perseveringly followed up, by preventing the usual flow of blood through the sac, enabled its contents to undergo a more perfect and general state of coagulation, and that this led to the increased tension of the tumour; and also that this state of tension or natural compression, combined with artificial pressure (see " Compression"), had the effect of damming up the opening into the aneurismal sac, by forcing and retaining the coagulated blood against the ruptured side of the artery, during which coagulable lymph was thrown out, and, becoming organized, effected the complete obliteration of the aperture.

" The operation for aneurism could not be without great rashness in this case attempted—1st, because the tumour appeared to spring from the artery before it emerged from between the scaleni muscles; and, 2nd, because a ligature cannot be depended upon so near the probable burst of this great bloodvessel, the coats of which might also have undergone a morbid change."

" I am disposed to attribute this case to great muscular exertion, in which the artery was ruptured, the cellular membrane forming the aneurismal sac, according to Scarpa."

Pelletan (' Clin. Chir.,' tom. i, p. 77, Paris, 1810) describes a case of subclavian aneurism of large size, which he cured by the Valsalva treatment. It was a large and diffused aneurism, occupying the axilla and mounting up over the clavicle, and considered by Pelletan as springing from the artery just emerging from below the clavicle. The man was aged 51, and had obscure symptoms in the region some two years, which were dissipated by lotions, and ten weeks before admission these symptoms reappeared, viz. obscure pain and engorgement of arm, and the presence of a tumour, which in five weeks gave way and produced the present condition, viz., a large ovoid tumour, the one extremity mounting above the clavicle, and the other descending below the level of the nipple, whilst the body of the swelling occupied the axilla, and was easily isolated from the arm, showing that the centre of the disease was situated high up just below the clavicle. He was placed under the Valsalva treatment :—Restricted diet, mineral acid drinks, compresses steeped in cold vinegar. Venesection to two pallettes on the first day; two venesections on the following day; two venesections on the third day; one venesection on the fourth day. On the eleventh day the tumour had diminished to one third of the size, and the pulsation became very obscure. Extreme weakness, and his general health soon became very alarming.

From the 6th of May to the 26th of May the tumour was covered with a bag of ice, which was removed frequently. He left the hospital on the 6th of June in a satisfactory state. He was seen at the end of a month, and was quite cured, with obliteration of the axillary artery. Three months afterwards he came to the hospital, and Dupuytren[1] saw him, but could detect only a small tumour in the axilla, reduced to the size of a nut.

Le Fort remarks that in this case it is difficult to admit the cure to be due to the Valsalva treatment, for the commencement of the cure began after two venesections and only one day's diet; he therefore regards it rather as one of spontaneous cure, facilitated by rest.

The five cases of death were Cases 22, 40, 44, 45, and 46, in only one of which was the Valsalva treatment fully carried out;

[1] Dupuytren, ' Clin. Chir.,' tom. iii, p. 3.

for in the others no venesection is recorded as having been performed, and they underwent general and local medicinal measures ; but these, however, all proved fruitless and of little service in preventing the fatal termination of the disease.

The aneurisms were not of very long standing, as far as the history can be depended upon, and, moreover, they were small in the first instance, when the treatment was commenced, yet soon afterwards became rapidly enlarged and diffused in four instances, all dying under a twelvemonth from the first recorded appearance (see table, p. 104, ' Guy's Hosp. Reports,' 1869-70).

The cause of death in two was from external hæmorrhage and exhaustion ; in one from ulceration into the trachea, hæmoptysis, and exhaustion; and two from exhaustion and coma, with pressure on the trachea in one instance. The ages were 37, 40, 43, 65, and 69.

CASE 22. *Wardell.*—Male, æt. 65, a fresh-looking ruddy man, who had always enjoyed good health until he had an attack of acute rheumatism in the right shoulder, for which he was bled and blistered without benefit. Then there first appeared a tumour, which on examination proved to be an aneurism in the clavicular region, of the size of the section of a small orange. He was then placed under treatment, consisting of total rest, complete cessation from all employment, the bowels kept open by gentle laxatives, all stimulating liquors avoided, and to have a spare farinaceous diet. To take digitalis in moderate doses three times a day. He continued this treatment for some considerable time, but the tumour gradually increased, and at the end of four months it was three and a half inches in its long diameter. The same plan of treatment was more or less carried out, and a figure-of-8 bandage applied over the tumour, but still the tumour increased so that in another four months it was ten and three quarter inches in its vertical diameter by eight and three quarters in its transverse. The integuments now began to be involved, and brown purplish ecchymosed patches appeared, and in the course of another month ulceration and detachment of part of the slough took place, and a slight oozing of blood set in, which continued to increase and to flow slowly out during the day, but this could not be checked, and he died on the following morning. The whole duration of the disease was only nine months. There was no post-mortem.

Remarks.—The aneurism was situated about the middle third of the clavicle and extended downwards. The abnormal pulsation extended and was lost behind the sterno-clavicular articulation, and the right carotid beat with far greater force than the left. There was a question as to its being aneurism of the innominata. No operation was proposed.

CASE 40. *Oppolzer.*—Male, æt. 40, left side. When first seen the aneurism

was of the size of a walnut and of three months' duration. He gave up work and was bled, but finding himself worse he came to the hospital. He was a strong man and always had good health. The tumour was three and a half inches long and two and a half inches broad, and extended from the outer border of the sterno-mastoid muscle. The case was chiefly characterised by the intense suffering from pressure on the brachial plexus. Leeches and ice were applied locally, and digitalis with morphia given internally, but the digitalis had to be given up at the end of two weeks, as the stomach could not bear it. In the course of the following four months the treatment consisted in the application of ice and leeches at intervals, the subcutaneous injection of morphia to relieve the intense pain, and the administration of veratria, morphia, and aconitine. The tumour, however, steadily increased during the whole time, so that at the end of the fifth month it was as large as a foetal head. He lingered on, suffering great pain, became icteroid, had difficulty of breathing, then was comatose, and died about six months after his admission. The whole duration of the disease was about nine months.

On examination the left subclavian was enlarged just where the axillary was commencing, and its coats thickened. The sac was of enormous size; it involved the scaleni muscles, pressed on and flattened the brachial plexus, and compressed the vertebral artery. The sac contained layers of fibrine with central dark blood-clots. Sac adherent to lung and extended into chest.

Remarks.—In the early stage it was questionable whether the aneurism was aortic or subclavian; the later pulsation in the femoral than in the radial arteries pointed to aortic, but the history and examination pointed to subclavian. No operation was proposed: the only one that could have been of any service would have been distal ligature of axillary and ligature of carotid.

CASE 44. *Dupuytren.*—Female, æt. 69, a case fully described at p. 110, 'Guy's Hosp. Reports,' 1869-70. It was a diffused aneurism, occupying the right axilla, and involved two inches of the subclavian artery. It had no pulsation in it and was thought to be a chronic abscess, and was opened. Much hæmorrhage followed, which was controlled by tight compression and bandage. It was now decided to take up the subclavian artery, as there was pulsation in the tumour, and we were on the point of proceeding to operate when on removal of these bandages the pulsations could no longer be recognised. On this we again commenced to doubt the existence of an aneurism, and to think, perhaps, that we had opened some small artery in the parietes of an abscess; however, on careful examination, we succeeded in discovering in that part of the tumour which elevated the clavicle some indistinct pulsations, accompanied by dilatation. I advised immediate application of a ligature to the subclavian as it passes between the scaleni, but my colleagues refused consent to any operation. The method of Valsalva was, therefore, had recourse to. The patient was bled on the spot. During four days she continued so feeble that we could not repeat the venesection. At this time a lancinating pain was felt in the tumour, the dressing was removed, and we found that an eschar of at least one inch in diameter was formed on the swelling; the

fate of the patient was decided. I again proposed the operation, which was again rejected. During the night two pupils set up with her and perceived that the dressings were rapidly soaked with blood; these were removed and the hæmorrhage arrested, after the loss of a large quantity of blood. Great prostration followed and death on the next morning.

On examination the tumour consisted of two portions, one formed by the sub-clavio-axillary artery dilated to the extent of two inches; and the other, the principal tumour, the diffused portion, communicating with the former by a slit in the artery, and of the size of an infant's head. At the border of the tumour there was a considerable dilatation of the arterial parietes which was separated from the main swelling by a deep depression in which were lodged the median nerve and axillary vein, the latter of these being in a disorganised state. A probe introduced into an opening made into the dilated portion of the artery readily found its way into the cavity of the tumour; and in like manner, when introduced into a healthy part of the artery, it passed into both the aneurismal dilatation and the interior of the tumour. On laying these open the larger aneurism was found to be bounded by the cellular tissue and contained clots of blood; it was this which had been mistaken for the abscess. The interior of this tumour communicated with the true aneurism by an orifice at the back and outer part of the latter. Above the tumour the subclavian retained its ordinary calibre for about two inches in extent, so that it might have been tied at this point. Below the tumour the artery was much diminished in calibre, and immediately beneath the sac the obliteration was complete, a fact which accounts for the absence of the pulse on the affected side.

Remarks.—This present case was clearly one of true aneurism, complicated with false or secondary aneurism by rupture of the sac. The distension of the integuments and the compression and cold employed to restrain the hæmorrhage sufficed to account for the gangrene which ensued. Dupuytren was convinced that ligature of the subclavian would have been the proper treatment, and determined to perform this operation in any similar instance which might present itself.

CASE 45. *Davis.*—A labourer, æt. 43. Strong-looking, florid, and has en-joyed excellent health. In March, 1862, he first noticed a small tumour above the right clavicle, which pulsated. He continued at his occupation for seven months, when he became subject to a cough and was admitted into the London Hospital. In the examination of his chest there was discovered an aneurismal tumour, extending from behind the sterno-mastoid muscle into the posterior tri-angle of the neck; it was about the size of a small apple, with strong impulse and a distinct bruit. The carotid artery could be felt above the tumour, but the pulse in the right arm was almost imperceptible. The chest on examination pre-sented the usual physical signs of bronchitis. There was no post-sternal dulness on percussion, no evidence of compressed lung, no difficulty of swallowing, and no marked alteration in the voice, which appeared full and natural.

Ice was applied to the tumour cautiously night and day, and he was ordered

good diet without stimulants. In the course of a few days he spat for the first time small lumps of coagulated blood, firm and fibrous, and latterly complained of dysphagia. In the course of the second week the tumour began to increase in size, and the expectoration of blood which had ceased for some days again reappeared. The pupil of the right eye was contracted and remained so until death.

At the end of a month the aneurism had still enlarged, and as the application of the ice was irritating the skin, a plaster of leather was made to intervene, but in four days' time this was removed and collodion painted over the tumour solely; this caused considerable diminution in the size of the tumour; it became harder and its impulse weaker. He left the hospital at the end of three months, but returned again at the end of a fortnight with a return of all his symptoms in increased severity. He had discontinued the ice and taken no care of himself; the hæmoptysis was continuous, and the dysphagia very marked. After a few days' intense suffering he sank, thoroughly exhausted, one week after his admission, from ulceration of the aneurism into the trachea.

On examination the aneurism involved almost the whole length of the subclavian and the distal two thirds of the innominata. Aorta not much dilated, but atheromatous. The aneurismal sac resembled a poloni sausage in form, but larger and more curved, and it was adherent closely to the trachea over a considerable extent. The convexity of the sac was highest between the scaleni, and the anterior muscle was spread out as a thin layer over the front, and was at least one and a half inch broad; external to its outer edge was the rounded distal end of the sac, at the extremity of which was seen the continuation of the subclavian artery; this vessel was quite impervious for a quarter of an inch in extent, and from that part it gradually enlarged to its normal calibre; the branches of the axillary were very large; of the vessels given off from the subclavian two only could be discovered, and these were impervious. The distal end of the sac was solid, with dense coagulum (fibrine), and there was also much solid material at the posterior part of its cardiac portion. About the opening of the carotid, however, and from there upwards and downwards there was a considerable cavity unoccupied by clot. At these parts the walls of the sac were thick and tough, and where adherent to the trachea it was increased by irregular layers of clot; here there was an opening into the back of the trachea, about an inch above its bifurcation, which would admit the end of a crowquill; in the recent state it contained a plug of coagulum, which projected into the trachea. About one inch higher in the trachea was a second but smaller opening into the sac.

Remarks by Dr. Davis.—In this case there was taking place a natural process of cure in the distal half of the sac, such as is sought for in Brasdor's operation; it was by far the most difficult half; nothing could have been easier than to have put the remaining fluid contents of the sac into a state of complete stagnation by tying the carotid beyond the sac, at a part where it was itself quite healthy.

CASE 46. *Lawrence.*—Male, æt. 37. Healthy, robust, muscular man, formerly

a sailor, and latterly employed in laborious work. Had a subclavio-axillary aneurism in the right side, very large and diffused, and of six months' duration. (For history, see ' Guy's Hospital Reports,' 1869-70, pp. 62, 79.)

On admission, September 7th, 1827, the Valsalva treatment was commenced; he was ordered to remain quiet in bed, to have milk diet, occasional purgatives and saline medicines, with tincture of digitalis every six hours.

On the 12th he was bled to 16 oz., and ordered to continue the digitalis.

14th.—The tincture of digitalis increased to 10 drops.

18th.—V.S. to 16 oz.

21st.—Pulse irregular and intermitting, the tumour increasing; to omit the digitalis.

24th.—Pulse recovered, and increased in frequency. V.S. to 16 oz., and to resume the digitalis in doses of 10 drops. From this date up to October 31st the tumour has been gradually increasing and extending below the clavicle towards the shoulder. He had been continuing the digitalis in small quantities. His pulse had become more full and frequent. He was bled to 16 oz., with temporary relief, and ordered to persevere in the digitalis combined with hyoscyamus. In the latter part of November the tumour became stationary, felt more firm, and the pulsation less distinct. He expressed himself improved, pulse quiet, and he slept better. He continued in the same state until the commencement of January, 1828, four months after admission, when the tumour was firmer and harder, and scarcely any pulsation to be distinguished in the tumour; its size, however, had increased somewhat. He continued the digitalis.

On January 15th the swelling suddenly and rapidly increased in size towards the trachea and sternum, but no pulsation could be felt in it; there was laryngeal irritation. He was bled to 16 oz.

19th.—The tumour had enlarged in all directions, the skin over it was tense and shining; pulse 120, and hard. V.S. to 16 oz. Cold cloths to the swelling. To continue the digitalis, and to have opium at night.

25th.—Tumour still enlarging, filling axilla, and extending back towards the scapula; the whole upper extremity is enormously swollen, and the whole side of the chest œdematous as far as the ilium; the face and neck also swollen.

On February 4th all the symptoms much aggravated; there is a large slough at the back of the scapula, produced by lying and the weight of the swelling. He continued gradually to grow worse until February 8th, when he had occasional delirium, and fell into a state of coma and died on the following day, five weeks after admission and eleven months from the date of the first recognition of the disease.

On examination the sac contained about three pints of recently coagulated blood, loose in the cavity, with some fibrine of variable thickness adhering to the sides. The case, which had originally been a true aneurism, had become diffused, so that its sides consisted partly of the extended arterial coats and partly of the surrounding muscles and bones. The coagulum lining the diffused portion of the aneurism did not exceed the thickness of half an inch at any part; generally it was much thinner; it peeled off easily, as if it had recently been deposited. The axillary portion of the subclavian opened into the sac about one inch beyond the origin of the branches of the subclavian; the inferior orifice of the vessel was at about the same distance above the origin of the infra-scapular artery; the two

orifices were about five inches apart, and connected by the smooth dense portion of the cyst.

Remarks.—The question of operation was agitated during the earlier period of this case. The extension of the swelling behind the clavicle rendered it impracticable to tie the artery on the outer edge of the scalenus. A ligature might have been placed on the innominata, and the perfectly healthy state of this artery would have been favorable to the attempt. However, since no patient had hitherto recovered after ligature of this artery, there was little encouragement to undertake the operation, which would probably have given no greater chance of saving life than was derived from the probability of a spontaneous cure.

This case offers a striking contrast to that of Yeatman's, Case 38. Both were males, and both of the age of thirty-seven; they were robust and healthy, and in a condition of constitution favorable for the trial of the efficacy of the Valsalva treatment. Case 38, however, was more suitable for its employment, the aneurism being circumscribed and of only three months' duration; whereas the other (Case 46) was already a very large aneurism and of six months' duration; still, the former one afterwards became diffused, so that they bore great similarity to each other, but in the one recovery took place, in the other death was the result.

Thus, then, as a résumé of the thirteen cases comprised under Section II, we have two cases only, viz. Nos. 38 and 46, treated by the Valsalva method of general and local bleeding, rest, diet, &c. The one recovered and the other died. These cases offer good examples of this treacherous mode of treatment, for, as Richet observes, it often fails, and is not without danger, for some have died from the syncope produced; still, it may be usefully employed in moderation as an adjunct with other remedies, such as compression, &c., which tend to cause coagulation of the blood in the tumour. Le Fort remarks that nowadays this treatment is but little studied in a scientific manner, and might be beneficially employed in those classes of cases where other methods have so often failed.

There can be no doubt, as some writers state, that a moderate discriminating use of this powerful means may be of benefit in strong, healthy, and robust persons, but would, of course, be strongly contra-indicated in the feeble, unhealthy, and

anæmic. Its beneficial effects in arresting hæmorrhage from the lung in hæmoptysis, by causing blood coagulation and plugging of the vessel, tend to give some weight to the arguments in favour of its adoption for the cure of aneurism.

The use of digitalis, we find, has been freely employed in nearly all the cases of subclavian aneurism, either alone or combined with other remedies. It is a favorite treatment in aneurism generally, but it does not appear to have had any specific or material effect in the cure of subclavian cases. The same remarks may apply to antimony.

Aconite was used in two cases, Nos. 40 and 43; in the one instance it was given in the ordinary dose, and continued for some time without any beneficial effect whatever; but in the other case it was taken accidentally in a poisonous dose, causing alarming syncope and prostration, but was followed by coagulation of the contents of the sac and a perfect cure. (See p. 145, 'Guy's Hospital Reports,' 1869-70).

An anti-syphilitic treatment with a moderate employment of the Valsalva method was stated to have been the means of obtaining a cure in Cases 41 and 42; but doubts have been expressed in the remarks appended to these cases at p. 17.

Local remedies were had recourse to in many of the cases, but these were regarded more as adjuvants than direct means for promoting a cure; still, in some instances the greatest stress was laid upon their advocacy in producing beneficial results.

Thus, in Cases 37 and 37*a* astringent solutions were perseveringly applied (see p. 17), and the spontaneous cures ensuing were ascribed to this alone. M. Guérin père strongly advocates the use of compresses dipped in astringent solutions' and refrigerants in cases of aneurism, but more especially when these have become diffused and near the surface of the skin; they then act directly in causing coagulation; he does not anticipate much benefit when small and deep-seated. We must, however, bear in mind that in the above two cases rest was also enjoined, as also strict diet, cold, and moderate Valsalva treatment.

Refrigerants and ice may be and have been advantageously employed in subclavian aneurism, in allaying inflammatory action, constringing the vessels, and promoting coagulation. These were used in Cases 37, 37*a*, 40, 45, 49, 51, 52, 58, 59, 98, 102, 104, and of especial service in Case 76. Broca, in his

work on 'Aneurism,' has given some instructive and useful researches on this subject. In Case 45 ice was applied continuously night and day for five weeks, and when the skin was irritated the intervention of a piece of leather was used, but replaced in four days by the application of collodion; this caused a considerable diminution in the size of the tumour, and the patient left the hospital soon after, but returned at the end of two months, and soon died. The distal end of the sac was found solid and filled with dense coagulum.

Richet remarks, "Cold acts on the blood in a remarkable manner; it hardens it, congealing it, but not coagulating it, and on rise of temperature the blood again becomes fluid. But clinical observation demonstrates that by this means aneurisms have been cured. What is the true explanation? At present physiology shows the absolute impossibility of making blood to coagulate in a durable manner in an aneurismal sac by refrigeration; but we must not on this account omit this treatment, as it certainly acts as an adjuvant, moderates inflammatory accidents, and likewise assists in the coagulation of the blood. Caution must be used in its employment, as too prolonged a use may cause sloughing."

Le Fort strongly opposes its use; he says, "Cold, instead of aiding coagulation, retards or even prevents it. Cold may excite contractility of the surrounding tissues, and even that of the sac, and determine a slight diminution in its size; it may, however, excite inflammatory reaction after it is left off, and this inflammation may bring about the coagulation of the blood. When placed in a bag it acts as a kind of direct compression. It may be dangerous by causing gangrene. It is hurtful, and of no use in promoting a cure." He also says, "Styptics and astringents are illusory, and do not appear to have any action whatever, because of the thickness of the skin and tissues over the sac, thus preventing the coagulating action of the liquids employed, such as tannin, bark, vinegar, perchloride of iron, tincture of iodine, &c." We cannot go quite so far as Le Fort in his strictures on this valuable remedy, cold.

Résumé of cases where no mechanical or surgical interference was adopted, comprised in Sections I and II.

First category :
  Cases of non-intervention . 22 cases— 4 recoveries, 18 deaths.
Second category :
  Cases of general and local
    treatment . . . . . 13 „   7   „   5   „   1 relieved.
  _____
    35 cases—11 recoveries, 23 deaths, 1 relieved.

	1st Category.	2nd Category.
Of the 11 recoveries, 6 were circumscribed—Nos.	11, 12a,	39, 41, 42, 43.
„ „ „ 5 „ diffused—	Nos. 2, 3,	37, 37a, 38.
„ 1 relieved, Case 47, diffused.		

	1st Category.	2nd Category.
Of the 23 deaths, 9 circumscribed—Nos.	4, 6, 9, 12, 13, 14, 18, 24,	45.
„ „ „ 14 diffused—Nos.	1, 5, 7, 8, 10, 15, 16, 19, 21, 23,	22, 40, 44, 46.

Of these 23 deaths, the duration of life from the first discovery of the aneurism is recorded in 17 cases—12 under first category and 5 under second : in 6 it is not stated.

We may fairly set aside Cases 13 and 14, where the aneurism was stated to have existed twenty-four years and eight years respectively, as some doubts have been raised as to the accuracy of the observations, but which, if correct, would lead to the advocacy of non-intervention.

Case 7 lived two years and eight months. This case was highly unfavorable for any operation, for after death there was found general dilatation of the subclavian and also of the arch of the aorta, and both vessels were the seat of atheromatous deposit.

Case 19 lived two years and five months. Here also it was impossible to have done anything beyond distal ligature of the carotid, for nature had already performed the distal operation for the subclavian. In this case the aneurism involved two thirds of the innominata, the first portion of the subclavian, and the carotid artery, each of these latter vessels being dilated to twice the size of the thumb.

Cases 1 and 8 lived two years. In both the aneurism involved the subclavian from its origin to the axilla, so that the innominata and the carotid were the only vessels that could be ligatured. No. 8 was much more extensive, involving the innominata and

the arch, and here the only operation feasible was ligature of the carotid.

Cases 15, 16, and 18 lived one and a half years. Nos. 15 and 16 too meagre in detail to offer any deductions. No. 18, in the early stage of the disease, might have had ligature of the third portion performed, and, indeed, it was proposed, but refused; afterwards the aneurism became diffused, and when seen was in no fit state for any operative measures. Ligature of the first portion might have been suggested latterly, but after death this part of the artery was found dilated and atheromatous, as also the aorta.

All the above nine cases belong to the first category, where the expectant treatment was adopted.

Cases 22, 45, and 46 lived about a twelvemonth; they were treated by general and local means, and one by the Valsalva method. In Case 22 no operation seems to have been mooted, as there was a doubt as to whether it might not be aortic. There was unfortunately no post-mortem. In Case 45 nature had performed the distal operation, and the surgeon might have tied the carotid had not the aneurism ulcerated into the trachea. The aneurism involved the innominata. In Case 46, during the early stage, ligature of the first portion of the innominata might have been performed, but was not urged, in consequence of the fatality of the operation.

Cases 4 and 40 lived nine months. In No. 4 the aneurism involved the first portion of the left subclavian, so that nothing could be done except the distal operation; even then it is questionable, as when first seen there was hæmoptysis, and shortly afterwards death from bursting into the bronchi. In Case 40 the aneurism was also on the left side, but occupied the third portion. The patient was placed under medical treatment, an operation not having been decided upon, and he died six months after admission. The sac was found to have involved the scaleni, compressed the vertebral artery, extended into the chest, and was adherent to the lung. No operation could have been of any service excepting ligature of the carotid.

Cases 21 and 23 lived about five months. In Case 21 the aneurism occupied the third portion; but the first portion, as well as the innominata, was found enlarged. The distal end of the aneurism was obliterated, as in Cases 45, 5, and 19, so

that the only chance would have been ligature of the carotid. In Case 23 the aneurism occupied the first portion of the subclavian, and the innominata was found diseased; here, also, the distal operation only could have been performed.

Case 44 lived only two months, and death was hastened by the opening of the sac in mistake for an abscess.

In the remaining six fatal cases there is no record as to the duration of life. These all belong to the first category.

Case 5.—Here nature had completed the distal operation, but the hazardous operation of ligature of the first portion of the subclavian and the innominata might have been performed, as both these vessels were found healthy.

Cases 6 and 24 were merely secondary aneurisms following upon popliteal aneurisms, in which death resulted from the bursting of the latter.

Case 9, as has been already stated, was a doubtful case of aneurism. It never increased in size, and gave no alarm as to the necessity of an operation. The patient died of bronchitis, and the supposed aneurism was found to be a local dilatation of the artery.

Case 10.—Ligature of the first portion was urged, but declined. The duration of life is not stated; there was found atheromatous disease of the vessels, but the large vessels were not dilated.

Case 12.—Died suddenly, previous to the performance of any operation; but if the ligature had been applied in the ordinary situation, external to the scaleni, the needle would have necessarily perforated the sac, as the artery was imbedded in and adherent to the sac.

SECTION III.—*On Compression used as a Means of Cure in Subclavian Aneurisms.*

Compression has been employed, first, on the artery alone, either where leading to or from the aneurismal sac—this being termed *indirect;* and, secondly, on the tumour itself,—termed *direct* compression.

Indirect compression, as a rule, is scarcely admissible in cases of subclavian aneurism; it can only be performed on the outer third of the artery, close to the scalenus anticus, and here

having for a back ground as counter-pressure the first rib and
the brachial plexus of nerves, the compression of which latter is
almost unbearable. Besides, there is seldom if ever any room
between the sac and the scalenus for this pressure to be properly
applied. Indirect compression of the artery has been accom-
plished both on the cardiac and distal sides of the aneurism
by morbid conditions, thus causing coagulation in the sac and
a cure of the aneurism; and these conditions have led to the
adoption of artificial means in imitation of the process.

A. We will first consider *compression on the cardiac or proxi-
mate side* of the aneurism. This has been effected by a sponta-
neous and morbid process in a remarkable case of cure of a
subclavian aneurism occupying the outer third of the artery.
It was discovered after death, and is related by Beauchène and
quoted by Hodgson. It is Case 31 of our series.

Princess of G—, æt. 60 years, died of dropsy of chest and inflammation of intes-
tine. The calibre of the aorta was dilated to at least three times its natural size.
Its external coat was of a deep red colour, very much thickened and covered with
calcareous deposition. The right subclavian artery was slightly dilated, and con-
tained from its origin to the part which passes behind the scalenus a dark-coloured
clot of the consistence of jelly; that portion of the vessel which passes behind the
scalenus for the extent of one and a half inch was filled by a very firm grey plug
which was impermeable to the blood, and adhered so intimately to the coats of
the artery that it could not be separated without their laceration. This portion
of the vessel was intimately united to the surrounding parts by dense cellular
membrane. Its calibre appeared contracted, but from its inferior side a small sac
originated which rested on the upper rib, and was filled with a friable clot of a
dark grey colour. All the branches of the subclavian artery originated from that
part of the vessel the cavity of which was obliterated, and were filled with grey
clots that adhered very firmly to their coats, and extended various distances into
their cavities from several lines to an inch. From the terminations of these clots
the arteries were permeable, and received blood from the branches communicating
with those of the opposite side, or from the corresponding branches below the
disease. To the origin of the common scapulary the axillary artery was filled
with a clot which did not adhere to the sides of the vessel, and was of light colour.
From the origin of the common scapulary, which, as well as the circumflex arte-
ries, was remarkably dilated, the other vessels in the limb were only distinguish-
able from those of the opposite side by their diminished calibre.

Scarpa makes the following trite observations on this point :
he says, " It is not improbable that in the cases of spontaneous
radical cure of external aneurism there concurs also a particular
position of the aneurismal sac, by means of which the sac, being
compressed by the ligaments and tendons, makes such a fold as

to compress with an equable force, as in the artificial compression, the trunk of the injured artery at its entrance into the sac, and is therefore capable of producing the approximation of its sides; and at last, on the adhesive inflammation coming on, the tube of the artery is also obliterated, which constitutes the second stage of the radical cure of this disease."

These remarks are exactly corroborated by Beauchène's case.

Artificial compression, both digital and mechanical, has been tried in several cases in imitation of the above process, but has generally ended in failure, owing to the small amount of room for its application and the intense pain induced; as may be seen in the several cases alluded to further on. It can only meet with success in exceedingly rare instances, as in the following one, where owing to some congenital malformation in the development of an extra cervical rib, thus elongating the artery and forming a good counter pressure, compression was carried out so as to lead to a successful issue.

CASE 52.   *Poland.*—Male, æt. 44; aneurism of right subclavian artery, size of filbert, fusiform, and considered by some to be a local circumscribed dilatation of the artery similar to Case 9. (For previous history see 'Guy's Hosp. Reports,' 1869-70, p. 116.) The whole detail of the case, with comments, is fully given in the 52nd vol. of the 'Med.-Chir. Transactions,' p. 277, to which the reader is referred; but some little inaccuracies have there crept in, which we have taken the liberty of correcting in this place.[1]

This is a most unique case of success attending digital pressure on the cardiac side of a subclavian aneurism, but this success was mainly due to the probable existence of a supernumerary cervical rib, and the unusually lengthened and abnormal course of the subclavian artery. The compression was managed by placing the thumb upon the artery on the outer border of the scalenus, and gently pressing the artery against the bony support behind, which required but very little force to completely arrest all pulsation. This pressure was kept continuously applied by relays of assistants for a period of ninety-six hours, with the exception of a few minutes' interruption; and it was found that about the twenty-fourth hour the patient became faint; at about the forty-eighth hour the tumour appeared to be smaller and harder, but still pulsating; at the sixtieth hour the patient was restless and excited, owing, probably, to some irregularity in the

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[1] Errata in Mr. Poland's paper in the 'Med.-Chir. Trans.,' vol. 52, at p. 279, line 5 from bottom, instead of "the *pulse could be felt* in the right radial artery, &c.," read "the *pulse could not be felt*" &c.; and at p. 294, line 12 from the top, instead of "*It is possible,* &c.," read "*Is it possible,*" &c.

Also an omission occurs in the history of the case, viz. the fact of the absence of the radial pulse leading to the first discovery of the aneurism.

amount of pressure used; at the seventieth hour there was very little further progress: the patient again became exceedingly irritable, and complained of headache, and the left pulse was feeble, about 60. Under these circumstances, at the ninety-sixth hour, the digital pressure was left off. The tumour had become much smaller and harder, but still pulsated feebly. At the end of a month all pulsation had ceased and the tumour was more solid, and shortly after the tumour began to diminish, and subsequently entirely disappeared, there being no vestige of the original subclavian artery, but there was a large artery running transversely across the space.

In this case ligature of the artery was seriously contemplated, but happily was not carried out. Holmes, in a private note to me, throws doubt upon the cure being attributable to digital compression, but regards it as one of embolism.

In his criticism on the case he writes, " But you do not discuss the probability of impaction of clot on the distal side of the aneurism, which I should have thought the more probable hypothesis in this case. The old cases where aneurisms were thought to have compressed arteries, such as Hodgson's, referred to on p. 30 of his work, appear to me to have been almost (if not quite) all of this nature, and such impaction of clot is a not very unfrequent cause of aneurism. See 'System of Surgery,' 1st edit., vol. iii, p. 353. Might not this have been the case in your patient?"

We think not, and for the following reasons:

The consolidation of the aneurism was gradual, extending from the periphery to the centre of the tube. There was no evidence of clot formation at either extremity of the artery, as in both places the vessel pulsated freely up to the obliteration of the aneurism into a solid mass. The aneurism was of the fusiform variety, and had no distinct sac and no opening from the artery into this sac as in ordinary aneurisms, whereby a clot might have become impacted.

There are other instances in which compression of the artery on the cardiac side of the aneurism has been had recourse to, and which we have casually referred to: thus,

CASE 59. *Hilton.*—Aneurism circumscribed. After the local application of ice for two weeks with no success, *digital* compression was tried on the proximate side of the aneurism, and kept up for forty-six hours; the tumour became smaller and the impulse less, but tenderness of the skin was produced, which necessitated the discontinuance of the pressure. It was resumed again five days afterwards for nine hours continuously, but the tumour enlarged and became more diffused,

and with greater impulse. Three days after this it was again tried for several hours on two separate occasions, but without producing any decided change. Manipulation was then had recourse to, and afterwards pressure again tried, but without avail. For further progress see 'Manipulation.'

CASE 75. *Paget*, in his case of subclavio-axillary aneurism, tried the application of an apparatus contrived by Rowlandson, but abandoned it as there was no chance of success.

CASE 85. *Scutin.*—Tried temporary compression by means of the thumb on the proximate side of a left subclavian aneurism, from time to time, and as no inconvenience resulted, permanent compression was undertaken, but could not long be continued in consequence of the intense pain.

Compression of the subclavian artery on the proximate side of an axillary aneurism has been several times attempted, and generally attended with failure; the only case worthy of record is that mentioned by Verneuil as occurring at the Hôpital Lariboisière, where in a case of large axillary aneurism numerous attempts were made to cure it by compression of the subclavian artery, and several apparatuses were uselessly employed, but a very simple one imagined by the patient succeeded better than all the others; it consisted in a sort of weight, which was maintained over the subclavian artery ; the amelioration was such that a cure was anticipated, but unfortunately the patient returned into the country before the pulsation entirely ceased; and he was lost sight of.

In a case related by Dr. Mackenzie, and quoted in the ' Dublin Med. Press,' 1853, vol. 29, p. 374, where there was an axillary aneurism directly under the clavicle, compression of the subclavian artery was made by the employment of an instrument; however, the aneurism continued to increase in size, so that the treatment was abandoned : but the aneurism soon after gave way and death followed, no attempt having been made to place a ligature on the artery.

B. *Indirect compression on the distal side of the sac* has indeed been met with as a spontaneous source of cure in some rare instances, yet it was only by morbid conditions, revealed after death, and not to be accomplished by surgery. The inability to perform distal compression of the artery arises in consequence of the impossibility of carrying out compression on the axillary artery in its deep-seated situation, surrounded, as it is, by nerves, which would allow of but little pressure. However, the

aneurism may be so seated, occupying the inner two thirds of the vessel, as to leave a portion of the subclavian artery free on the distal side, on which compression may be tried. This was the case in Case 12*a*, recorded in the appendix at p. 156, ' Guy's Hosp. Reports,' 1869-70, where the aneurism was on the right side, of the size of an orange, occupying the inner portion of the artery as far as the vertebral artery. Here an attempt was made to apply pressure on the subclavian artery on the distal side of the aneurism by digital pressure under chloroform. This was continued for the space of an hour, but without effect.

CASE 30. *Hodgson.*—Is an example of the kind cured by a morbid process. A robust soldier had a very large aneurism of the aorta, which had caused absorption of the whole of the upper bone of the sternum, and appeared externally in the form of a large pulsating tumour, extending nearly as high as the chin. He died, worn out by impediment to respiration and deglutition.

On examination the left subclavian artery, soon after its origin, was apparently dilated into a tumour, resembling, in its size and shape, a very large chesnut. Nothing indicated the presence during life of this obstruction; but it had been remarked that, for many months before his death, the pulse could not be felt in the left wrist. The aneurism of the aorta had compressed a portion of the subclavian artery beyond the little aneurism, and had caused its obliteration. The small aneurism was nearly filled with layers of coagulum, and the subclavian artery, from the point where it emerged from this little sac, was completely filled with a firm ligamentous substance. The vertebral, internal mammary and superior intercostal arteries were very much contracted, and filled with a similar substance. Thus had the cure of this little aneurism commenced in consequence of the pressure which the greater one had produced upon the subclavian artery. The inferior thyroid artery was not obliterated, and through it the blood must have passed in a retrograde direction into the trunk of the subclavian artery, which, although much contracted, was pervious from this point.

Case 19 is also another instance of compression on the distal side ; it has been already alluded to at p. 11.

c. *Direct compression* has been employed in several cases of subclavian aneurism ; it is a remedy of the highest importance for consideration ; it was formerly held in great estimation, but abandoned in consequence of its occasioning rupture of the sac or sloughing of the integuments over the tumour, and leading to fatal hæmorrhage. We have several examples in which direct compression was used in subclavian aneurism, and these exhibit the two distinct modes of applying this means—the one leading

to a beneficial result and ultimate cure, the other causing disastrous consequences.

The first method is well shown and depicted in Case 38, and also in Case 49, in which latter case compression was employed as an *adjuvant or palliative*. It was used with very great moderation, not so much with the object of producing pressure, as of forming a means of protection from external injury whilst the man followed his laborious employment on board ship, and also of assisting in preventing the expansion of the tumour, which was a source of great dread to the patient, and much annoyance.

We must, however, bear in mind that in this case the direct means of cure might probably be due to impaction of clot in the distal end of the artery.

The second method has for its object the trying to effect a cure by means of expelling the fluid blood and pushing the fibrinous walls together, so as to prevent any further ingress, and thus cause consolidation of the whole by adhesion of the walls, the lining clots becoming transformed and organised into one solid mass. This method is the one generally alluded to in surgical works under the head of direct compression, and is wisely strongly condemned; but more especially is this the case in subclavian aneurism. Moreover, here we have a special counter-indication to its employment in the presence of the brachial plexus behind the aneurism, any severe pressure upon which is most intolerable. We also must not forget that subclavian aneurisms are most prone to rupture on any undue violence.

CASE 49.   *Corner.*—M—, æt. 46, was the subject of a right subclavian aneurism, of the size of a hen's egg, and of six months' duration. Seven years previously he had a popliteal aneurism on the left side, which was very small, and underwent a spontaneous cure. Two years afterwards he had a similar aneurism in the right popliteal space, which was four inches long and three inches broad, and this was successfully treated by compression of the femoral artery. He followed his usual employment, and continued in tolerable health until the appearance of the present subclavian aneurism. He became an in-patient at St. Thomas's Hospital, and the question of ligating the subclavian artery in its first part was mooted; but on consultation the operation was negatived. When he placed himself under Mr. Corner's care the tumour was of the size and shape of a hen's egg, but more flattened. The contents appeared to be perfectly fluid, and the aneurism seemed to be due to dilatation of all the coats. The tumour was close to the scalenus, so that there was no room for pressure on the artery on the cardiac side of it; a ligature of the first portion or of the innominate was considered to be of too

great a risk. He was, therefore, kept in bed, and ice was applied over the tumour continuously during the day. The diet was animal food and bread without vegetables. No benefit, however, resulted from this treatment, although carried out for a considerable time. He resumed his ordinary diet, and went about as usual. In the course of a few months he wished to resume his work, and was advised to have some protection over the pulsating swelling above the clavicle. A piece of leather was accurately moulded over the tumour and surrounding parts, so as to form a kind of cup for its reception, and was fixed on by long straps passing under each axilla in the form of a figure of 8, as used for fractured clavicle. From this he derived great benefit and comfort, experiencing less uneasiness in the part, and a greater feeling of safety when making exertion. He now acted as shipkeeper, avoiding all laborious jobs, and lived on the diet of an ordinary working man. About a year afterwards he felt himself suddenly unwell whilst walking along the road, experiencing sickness and vertigo, so that he was obliged to hold on to something, to prevent his falling; and on feeling the swelling afterwards he found no pulsation in it. He was seen by Mr. Corner a few days after this, when there was no pulsation to be felt, but the bulk of the swelling was hard. When again examined, in the course of another month, neither swelling nor pulsation could be felt. A slight impulse existed in the radial and brachial arteries. The temperature of the limb was somewhat lower than that of the opposite limb. Sensation was perfect. He was again seen six months afterwards, and no trace of the aneurism could be found. The pulse was still not quite so full as on the other side, and there were some irregularities in the beats of both. He was in active employment as a shipwright.

CASE 50. *Warren.*—M—, æt. 39. History of case fully detailed at pp. 116 and 126, 'Guy's Hosp. Reports,' 1869-70. The aneurism was on the left side, diffused, and of an enormous size, being seven and a half inches in circumference, and of fourteen months' duration.—There was a pulsating tumour over the clavicle; its anterior inferior portion one inch from sternal end of clavicle. Circumference of tumour seven and a half inches. Hand and arm have been swollen all the winter. The whole triangle of the neck above the clavicle was filled with the tumour, which extended nearly to the sternum, so that tying the vessel on the cardiac side seemed impracticable, and the only feasible plan was ligature on the distal side of the tumour below the clavicle—a project hardly worth attempting.

From 12th March to 30th April cold applications were made, varied with compression by a heavy weight in the shape of a cannon-ball. There was no diminution in its size; it seemed rather increased during his stay in the hospital, nor was there much amelioration in the symptoms, except in the pain, which was entirely assuaged by the compression. General health much improved.

May 4th.—Discharged relieved.

Some months after leaving the hospital he was admitted into the State Hospital, at Rainsford Island, in October, 1854, under the care of Dr. Lothrop. He stated that he had fallen upon the shoulder of the affected side a few days before, and suffered much pain. The tumour was tender to the touch. Motion gave great pain, and the only position he could bear was lying upon the sound side. The skin over the tumour was tense and shining; there was no pulse at the wrist; his arm was powerless and œdematous and dropped. The tumour had more the appearance of a large abscess than of an aneurism. There was no tremor

or pulsation in it, as communicated to the hand; no sound or aneurismal murmur. In about three weeks the pain ceased, and the patient was able to get up and put on his shirt. In time the tumour began to point perceptibly near the middle of the clavicle, and spontaneous rupture took place during March, 1855. This was accompanied with a profuse discharge of mixed pus and blood, dark and rather thick, in quantity about two quarts. It continued to flow for two or three days, gradually decreasing. A simply purulent discharge continued for several months. No bad symptoms accompanied or followed, and he was up and about shortly after the rupture. The tumour rapidly subsided, and was followed by depression. The shoulder fell forward. An opening about half to three quarters of an inch in diameter remained, into which projected the pointed and carious end of humeral portion of clavicle; sternal portion not visible; middle portion wanting. When he left the hospital he had no distinct pulse at the wrist, and the arm was stiff and powerless. General health improved. Resumed his old employment of ship's cook. About a year after this he presented himself in good health, but with his arm in a sling.

Case 51. *Warren.*—M—, æt. 41, had an enlarged irregular aneurism in the supra-clavicular space, presenting three projections, and from its original size of a pigeon's egg having extended the whole length of the clavicle; it was of thirteen months' duration. No operation seemed feasible in this case also, and he was therefore submitted to the following treatment:

He was placed on his back in bed and kept on a limited diet of a pound of solid food, and a pint of liquid food, every twenty-four hours, without meat. Bags of ice were applied, and in less than two hours produced a very sensible effect in reducing the pulse. On the third day compression was tried with Dr. Arnott's air cushion, which was applied through the day, with the exception of three intervals of half an hour each, when bags of ice were substituted. On the fifth day he complained of severe pain in the lower lobe of the tumour, as also some in the upper two lobes, with a feeling of numbness in the arms. Ice was used for fifteen minutes instead of half an hour. Compression was discontinued from the impracticability of making it equally over the whole tumour on account of its irregular surface and large size. Seven days after this, the patient having complained of more pain in the smallest projection, the ice was discontinued. Soon afterwards he left the hospital, apparently not much relieved, but in fact from this time the tumour gradually subsided, and about one year afterwards he came to the hospital, stating that the tumour had entirely disappeared, and that he was quite well.

Remarks.—Ice and compression, together with rest, in both these cases seem to have given an impetus to the tumour; in the one leading to obliteration of the sac, in the other to suppurative and destructive inflammation.

Case 38. *Yeatman.*—(For full account of this case, see p. 19.) "After placing patient under Valsalva treatment for three months, and the circulation being now favorable to the obliteration of the opening into the aneurismal sac, I embraced the first opportunity of making pressure to effect this. Considering, however, that the sudden compression of an artery seldom fails to increase its action, I

thought it right to proceed in this respect by stratagem. I therefore determined to begin my pressure by only affording a tolerable support to the tumour, increasing it gradually as circumstances might indicate. For this purpose I contrived a small doe-skin bag firmly stuffed with horse-hair, rising towards the centre like a graduated compress, and having two broad bands and buckles. The centre part of the compress being applied to the superior and anterior surface of the tumour, one band was passed obliquely across the breast under the right axilla, and brought over the back, and was buckled to the upper edge of the compress at the superior costa of the scapula; the other band was passed under the left axilla, and met its fellow in the opposite direction. This compression received an additional support by a long calico roller. The V. S. and digitalis were at the same time continued. During the ensuing five months the pressure had been gradually increased, but without producing any apparent good; the tumour became larger, and the superincumbent skin somewhat turgid and sore; requiring the application of leeches.

At the end of another four months the tumour became stationary; the pressure was increased; the tumour remained stationary for three months, when it became less, and remarkably tense, and pulsation scarcely perceptible.

At the end of seven months, being one and a half years under treatment, no trace of the tumour was to be discovered."

Remarks.—It is questionable whether the cure of the aneurism was in any very great degree to be attributed to the artificial pressure. Firstly, because a *small portion only* of the contents of the sac could be thrust back into the artery; secondly, because the pressure was not for a *long time* attended with any important advantage; and, thirdly, because the tumour did not cease beating nor diminish in size till it had *acquired a great degree of tension.*

Direct compression is also referred to in the accounts of the following cases:

CASE 11. *Porter.*—In the case described by him of a left subclavian aneurism undergoing spontaneous cure, he says, "I do not know but that gentle compression might have been attempted, but the position of the tumour was so unfavorable that such treatment could have had no very decided influence on the disease. Nevertheless, from day to day the violence of the pulsation subsided, and the size of the tumour diminished, and he left the hospital well."

CASE 44. *Dupuytren.*—Direct compression was used to check hæmorrhage, but not with a view of a curative action in the aneurism; it was attended with disastrous results, viz. sloughing of the integuments, &c.

CASE 55. *Porter.*—See "Acupressure."

In this case when the tumour first attracted attention it was not larger than a small nut, and the patient could make it disappear by pressure with his finger; he had been for six weeks in another hospital, where pressure on the tumour had been tried, but without benefit. After acupressure on the distal side, Porter

again tried direct pressure on the aneurism, which had become partly consolidated, but now remained *in statu quo;* a small chamois bag containing shot was kept on the tumour, alternately with bladders of ice; the aneurism, however, again appeared to enlarge, and the pulsation was as strong as at first.

CASE 57. *Fergusson.*—See " Manipulation." At the end of six months, after the employment of manipulation, an attempt was made to keep up continued pressure, but it proved so unsatisfactory that it was given up.

CASE 58. *Little.*—See " Manipulation." Three months after manipulation, and when the tumour was more solid and had no pulsation, pressure was made over it.

CASE 60. *Abeille.*—See " Galvano-puncture." Immediately after galvano-puncture was performed a compress of one kilogramme weight was placed over the tumour and along the course of the artery, and maintained there for ten hours.

SECTION IV.— *On the Treatment of Subclavian Aneurism by* " *Manipulation,*" " *Kneading,*" (" *Massage,*" Fr.).

Richet, in his article on ʻAneurism,ʼ mentions that Richter, according to Bérard, thought that a clot detached spontaneously from an aneurism might be carried into its opening of communication with the artery, and cause obliteration of the sac and the vessel.   This is, however, not the precise object of manipulation, and the suggestion of the present practice was first derived from the accidental displacement of clot from the sac, and its becoming impacted in the orifice of the artery on the distal side of the aneurism.   Fergusson[1] was the first to employ this means, and he did so in two cases of subclavian aneurism.   The operation consists in forcibly squeezing and manipulating the contents of an aneurismal sac, so as to detach a portion of the fibrinous clot, which is carried into the distal side of the artery, thereby arresting the circulation through the aneurism, and in fact acting in the same way as compression or ligature on the distal side of the sac.   Although the current of blood tends to carry the detached portions towards the capillary side of the artery, these clots may, however, be thrown into the proximate or cardiac end of the vessel; and may even be carried into the carotid, or if small, into the opening of the vertebral artery, and so produce serious results.

The mode of operation is simple, and is performed, as the name implies, by a kneading process with the fingers and thumb.

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[1] Fergusson, ʻMed.-Chir. Trans.,ʼ vol. xl.

Broca has suggested the breaking up of the clot by means of a trocar and canula, but this is highly to be deprecated, as wounds made into aneurismal sacs may not only set up inflammation, but also fatal hæmorrhage.

Manipulation is best adapted for small circumscribed aneurisms, and cannot generally be used in the more advanced kinds, although in Little's case the aneurism was threatening to burst externally, but he used the precaution of adopting Guérin's treatment of cold application for three weeks, thereby somewhat solidifying the contents before he employed manipulation.

We have abstracts of 4 cases, all males. Two were cured, both on the right side; and 2 were fatal, one on the right, the other on the left side.

CASE 56. *Fergusson.*—M—, æt. 40. Right subclavian aneurism, of size of small orange, and of two years' duration. The part of the vessel involved seemed chiefly between the scaleni muscles. The pulsation in the tumour was remarkably distinct, and it did not appear that much fibrine was present. The manipulative measures were little more than momentary. The immediate effect was startling. The patient's hand became remarkably pale, and he had a confused expression of countenance; he started from his seat, exclaiming, "What have you done? you have made me tipsy;" and he staggered as if about to fall. Pulsation had returned in the tumour, but had ceased in all the arteries below. The patient never lost consciousness, and soon rallied from mental confusion; he complained of pain in the hand and forearm, such as he had felt two years before. In the evening pulsation returned in all the vessels of the limb. On the following day the tumour was again manipulated, and the immediate effects were the same as yesterday— no return of pulsation in the vessels, but the tumour continued as before. The pulsation in the vessels again returned.

On the nineteenth day the tumour was still throbbing, but had manifestly declined. There was still a bruit. From this time the tumour seemed to diminish and become firmer, although pulsating. The arterial pulse extended no higher than the arm. This patient suffered from great pain, general emaciation, and died, worn out, eight months afterwards.

A few days before death the aneurism partially gave way, forming a mass of the size of a small orange. On examination the axillary artery was found filled with a firm plug of fibrine. Sac had contents of solid fibrine of old date, and some recently coagulated blood. It had given way at its lower and back part.

Holmes remarks ('System of Surgery') "The tumour was considered to be somewhat solidified, but it never ceased to pulsate; and after a few months it caused the death of the patient by bursting."

Richet observes ('Dict. de Chirurg.'), "In this case the manipulation produced disturbance in the circulation of the arm

and brain, without bringing about immediate changes in the tumour ; and it was only by the consecutive evidence of two practitioners, who watched the case, that the aneurism was reported as rather diminished than increased. In truth this is not very satisfactory in favour of the method, inasmuch as rupture of the sac supervened some months after the manipulation."

CASE 57. *Fergusson.*—M—, æt. 44. Similar case. Half an hour after manipulation he had paralysis of the face, arm, and leg, on the opposite side to the aneurism. He retained consciousness, but felt giddy and confused. During the ensuing night he made a partial recovery. He remained thus for two months. There had been occasional peculiar sensations in the course of the collateral circulation. There was little material change, excepting that the paralysis of the left side had diminished, and that the pulse could be detected at the right wrist ; but for the last few days pulsation in the wrist again ceased. Manipulation was now made for the second time, but with no perceptible effect, except that for several days the patient complained of slight pain about the shoulder; but this soon ceased, and in the course of a fortnight he was sent into the country, and he had acquired a greater use of his left side. He followed his occupation as a seaman for some time, and was seen at the end of six months, when the tumour was much about the same, and a slight throbbing could be felt in the radial. An attempt was now made to keep up continued pressure on the tumour, but it proved so unsatisfactory that it was given up. About a year afterwards he came again to the hospital. The tumour had then entirely disappeared—not a trace to be perceived. A slight pulse could be felt at the wrist. The paralysis of the left side had also disappeared.

Holmes (op. cit.) observes, " In this case no perceptible effect was produced in the tumour at the time, nor was it much changed at the end of a year; but after two years of laborious occupation the tumour was found to have disappeared. It is doubtful whether the result was due to spontaneous changes or to accidental displacement of the contents of the tumour in the course of the patient's frequent exertions."

Richet (op. cit.) says, " It is impossible to accept this case as an example of cure by manipulation, because there was an interval of two years between the treatment and the cure, and during this interval the tumour was examined several times, and did not appear to be notably modified. One is bound to consider this case as doubtful, if not even unsuccessful, the cure having been rather one of a spontaneous character."

CASE 58. *Little.*—M—, æt. 53, albino. Right subclavian aneurism, of size of goose's egg, and of eight months' duration. It had lately become of considerable

size, was soft and compressible; slight inflammation over the surface, and threatening to burst. Sedatives and cold applications were employed, which modified the violence of the pulsation. At the end of three months venesection was performed twice, and ice was constantly employed for three weeks, without producing any manifest improvement, except a subsidence of the inflammatory redness of the skin. Manipulation was now performed by gentle and steady alternating pressure, and some clot was displaced towards the distal end of the artery; at the same time pernitrate of iron was administered internally. Ten days after this it was found that pulsation had ceased in the radial, brachial, and axillary arteries, and the tumour had become more solid; the bruit and pulsation diminished, as also the pain in the arm, although he complained of coldness in the shoulder. At the end of a month the arm became greatly wasted and partially paralysed, retaining very little sensation, and scarcely any power of motion. In the course of three months there was no pulsation in the tumour, but pressure was now made over it. At the end of a year the aneurism was a third less in size and quite solid. The temperature of the arm was natural, and he could use it tolerably well. The sensation had returned, and there was slight pulsation in the radial artery. He was again examined, sixteen months afterwards; the tumour then was of the size of a walnut, and the sensation and motion entirely restored.

Remarks.—Much of the success must be attributed to the previous treatment, whereby the aneurism was placed in a favorable position for the execution of the manipulative proceedings; still, the case was attended with much hazard.

CASE 59. *Hilton and Forster.*—M., æt. 36. Left subclavian aneurism of size of half an orange; its duration not recorded. After the failure of the application of ice and the employment of digital compression on the cardiac or proximate side of the artery for some time, forcible manipulation was performed for a minute and a half, but without any beneficial results ensuing. The local application of ice and direct compression were used. The sac gave way, and the result was an enormous diffused aneurism, occupying the axilla and thoracic region, and almost totally arresting the circulation in the brachial artery. Palliative treatment was now adopted. The patient lingered on, gradually sinking, and death from exhaustion occurred nine months after admission. When first seen it was not considered advisable to ligature the vessel.

On examination the original aneurism was found to have been formed in the lower part of the subclavian, where it becomes axillary. The tumour was of the size of a man's head, filling the whole axilla, laying bare the walls of the chest, and opening into its cavity. It was filled with coagulum, and surrounded by layers of fibrine. See prep. 1501[97], Guy's Hospital Museum. Condition of artery to and from sac not recorded.

CASE 62. *Porter.*—M—, æt. 62. See attempt to ligature vessel. Here was a large right subclavian aneurism, six inches in transverse diameter and three inches in vertical, where an attempt was made to ligature the innominate for an hour and a quarter, under the most painful exertions, but was abandoned. The tumour, however, from that moment gradually diminished, and in the course of

two months it was not one quarter the size, and eventually disappeared. He was alive and well eight years afterwards.

One must consider this as a case of manipulative surgery in the true sense of the word, it being probable that this was the means of producing the favorable result.

Remarks.—The treatment by manipulation is not without danger. The danger consists in—

1. The possibility of rupturing the sac, especially where the aneurism has involved the superficial structures, and is threatening to burst externally.

2. The detaching of too small a portion of clot, so that it is carried away into the circulation through the axillary artery causing embolism, or through the proximate end of the artery into the carotid or vertebral artery producing an obstacle to the cerebral circulation, as in Fergusson's first case. The effects of embolism on the cerebral circulation are not so liable to occur on the left side, as the clot would pass more readily into the arch and thoracic aorta.

3. The detaching of too large a clot, which cannot plug the opening, and which, therefore, remains loose in the cavity, acts as a foreign body, and excites inflammation and suppuration of the sac, with its serious attending consequences.

4. Inflammation of the sac and suppuration set up by manipulation, independent of detachment of clot.

5. Gangrene of the limb from sudden closure of the axillary artery, where the collateral circulation has not been sufficiently enlarged.

Hence it appears that the necessary condition to ensure success is to detach such a fibrinous clot as may fit in and plug up the orifice of the vessel upon the distal side; a proceeding requiring the greatest tactile nicety, which it is impossible to regulate; and also that there be no subsequent complication, such as inflammation of the sac, &c.

It is not improbable that in Case 59 rupture of the sac was the consequence of manipulative proceedings extending over a period of a minute and a half.

In Cases 56 and 57 we have examples of the danger and risk of the proceeding, for in both these cases sudden faintness immediately followed the manipulation, and in Case 57 this was attended with subsequent paralysis. It seemed possible that

some of the broken-down fibrine was squeezed towards the mouth of the vertebral or carotid arteries, obstructing the flow of blood to the brain (Holmes).

ADDITIONAL CASE. *Morgan* ('Medical Press and Circular,' February 17th, 1869).—*Subclavian aneurism on right side, involving the second and third stages of the artery; ineffectual palliative attempts; pressure; ice, &c.; manipulation unsuccessful.*

Thomas M'C—, æt. 35, of stout build. About seven years before, he was troubled with pains and stiffness all through the arms and shoulders, which he attributed to working as a dyer. The pain, &c., in the left arm soon after abated, but increased in the right, his occupation now being chiefly that of cutting up bread in a union, and he was soon obliged to give this up. About nine months ago he felt a " kernel " above his collar-bone, which " went ticking like a watch " (viz. twenty-one months before the operation); never been affected with syphilis. On January 22nd, 1868, the tumour was about the size of a large hen's egg, pulsating vigorously and centrifugally, extending from a level of cricoid cartilage to the clavicle and below it; there was a bruit over the tumour, and the hand and arm were somewhat numb; the pain was rather severe at times. On examination it would appear that pulsation from the axillary downwards was suddenly arrested, as supposed, from the disengagement of a plug of coagulum, as in the "manipulative " method of treatment. This condition lasted till the end of February, when pulsation again returned in the vessel of his arm, and continued for a period of fifteen days, when again the stream was interrupted. During this period he had been taking *ten drops of digitalis tincture and then three grains of acetate of lead* every four hours. On the 24th *the arm was put up in a constrained position, with the hand on the back of his head,* as this stopped the pulsation. The transversalis humeri artery and other vessels were now enlarging rapidly.

March 28th.—Tumour solid; pulse disappeared, and pulsation in tumour nearly so; from this time to April 15th it remained stationary. He unfortunately got excited from drink on one occasion, and from that day the tumour became more active; the pulse in brachial, ulnar, and radial, however, did not return. *He still carried out the plan of treatment of keeping the arm in the same position, so as to* restrain pulsation in the tumour, and, indeed, the patient preferred it.

September 28th.—He was admitted into Mercers' Hospital. He was spare, but not emaciated, and suffered from paroxysms of pain. The pulse at wrist and large vessels had totally disappeared; the tumour was pulsating softer above than below the clavicle; there was a slight bruit over the clavicle. The transversalis humeri and colli arteries had greatly enlarged, and could not only be felt, but also seen, passing over the tumour. Temperature of both arms the same. The affected arm was greatly atrophied; the fingers most markedly clubbed. The anæsthesia was well marked. He was particularly sensitive to cold. Heart sounds normal; no bruit at origin of aorta. No throbbing of carotids or headache.

The patient was warmly clad in flannel and the limb wrapped in wadding, when the pain was severe. The *parts were painted with tincture of aconite,* which gave most relief, and iron with morphia internally. Nutritive diet, rest in bed with shoulder in position, and a *shot-bag of from six to eight pounds applied over the tumour.* This not only diminished pulsation, but relieved pain.

November 25th.—The pain has now rather suddenly increased, paroxysmal in character, and extending down the arm and side; there is no abnormal heat, and the radial is now perceptible, the brachial not being so evident. The tumour is enlarging and becoming more soft and distinct, especially below the clavicle, the wave of fluctuation, as it were, being easily felt. Ice was now applied over the tumour, which diminished the pain very perceptibly. Iodide of potassium in fifteen-grain doses prescribed three times a day. The pain was described as enormous and unendurable, and during the paroxysms he urged most piteously to have something immediate done to him.

28th.—Enlargement gradually progressing. *Carefully applied manipulation* was now tried, to detach, if possible, a plug from the tumour, but unsuccessfully, and the attempt was carried out as vigorously as was thought consistent, considering the size of the tumour.

From this report up to December 14th not much change; the iodide of potassium was left off, as the patient was thinning and under the influence of the medicine; the pulse at the wrist had perceptibly increased, though still small; temperature in both arms the same. The tumour was now rapidly increasing below the clavicle and becoming soft, and the patient could no longer bear the intense pain. Operation was proposed.

17th.—Under chloroform, ligature of first portion. For continuation see Ligature of first portion of Subclavian Artery.

Section V.—*On the application of Irritants and Escharotics in Subclavian Aneurism.*

As regards blisters, moxas, and applications not amounting to the action of escharotics or actual cauterisation, one would hardly have thought that such local means would have been had recourse to. Blisters have been applied over aneurisms inadvertently, the nature of the tumour not having been recognised, and yet no good or ill effects produced. But some surgeons have employed these purposely with a view to excite a cure, by setting up inflammatory action in the walls of the sac, and thus effecting coagulation of the blood. It has been energetically tried by Langenbeck in a man æt. 45, who had a circumscribed aneurism of the size of a pigeon's egg, and of eight months' duration; it was followed by some benefit for a time, but had no effect in checking the progress of the disease. In his case,

No. 48 of our series, large moxas of charta chromata (Jacobson's, of Copenhagen) were applied over the aneurism at intervals of three to four weeks, producing a copious and constant suppuration from the surface, and extending over a period of four months. The symptoms from which he suffered in consequence of the pressure of the aneurism were relieved, and the pain entirely left him; the aneurism was somewhat smaller, but still pulsated. The patient went into the country, and remained in perfect health for about two years and a half, being able to follow his usual business, and suffering no inconvenience from the aneurism. At this time he went to the sea-side, where the weather was exceedingly hot; the aneurism then began to enlarge and pulsate more forcibly, and the arm became weaker and the pain again occurred; it continued to increase in size to that of a closed fist, when he applied to Langenbeck, who now determined upon the use of hypodermic injections.

Escharotics and *cauterisation* have been had recourse to in a case of subclavian aneurism; it is the case of Bonnet of Lyons, placed in our collection between Nos. 54 and 55. This has an asterisk prefixed to it and is without a number, inasmuch as the aneurism was the consequence of a wound of the artery, and, therefore, was hardly to be classed with the other aneurisms. The following is an abstract of the case:

BONNET.—' Bull. de la Soc. de Chir. de Paris,' tom. iii, 1852–53, p. 600.

Augustus G—, æt. 25, good health, sound constitution; a cultivator in the environs of Lyons, received, on 5th December, 1852, several stabs with a knife, one of which entered in the left supra-clavicular region, and produced the following accidents.

From the wound there issued immediately considerable arterial blood; and it was thought to arrest it by bringing the edges of the wound together by two sutures and compression. This did not succeed in arresting the hæmorrhage, or only in a temporary way; the edges of the wound did not unite, and, notwithstanding the compression, the flow of blood took place several times. At the end of eight days he had a very profuse hæmorrhage, which became more and more frequent; and in the third week, viz., between 25th December and 1st January, the bleeding occurred on two different occasions to such an extent that his end was feared, and he was sent to the hospital immediately. The pain produced by the accident was extremely severe at first, and there were no means of finding rest, night or day; he was constantly rising from bed and running about the room and crying out plaintively; he thus caught cold, had bronchitis and loss of voice. He had paralysis of the upper extremity of same side; the fingers only could, however, exercise some movements; he was exhausted by the hæmorrhage and

great suffering. At the base of the left subclavian triangle, almost immediately above the clavicle, there existed a tumour of the size of two fists; it was ill circumscribed, soft, without presenting any manifest fluctuation, and extended transversely from inner third of clavicle to external border of trapezius; of a rounded form, the portion of the sphere which it described from below upwards was about fourteen centimetres in extent.

About the centre of the tumour was the cicatrix of a wound twenty-four millimetres long and nine wide; it was directed from above to below, and closed by a clot of blood, half dried. On applying the hand over it, there was pulsation synchronous with the pulse, and evident movement of expansion; there was manifest *bruit de souffle* in a space of twenty-five centimetres in diameter. The whole left upper extremity paralysed, both as to sense and motion; hand œdematous, and sometimes the seat of severe pain; no pulsation in axillary, radial, or ulnar.

With the "*volte-faradique*" of Dr. Duchenne one could not cause any contraction, nor any sensibility in the muscles of shoulder, arm, forearm, or hand. The serratus magnus, rhomboid, and trapezius were the only muscles which acted under local Faradization.

The case was considered to be *traumatic aneurism of subclavian*, or of the trunk of one of its principal branches.

Consultation was held; compression declared useless. Galvano-puncture inadmissible because one could not arrest momentarily the flow of blood into the tumour by compressing the subclavian artery internal to the tumour. The only chance was considered to be ligature of subclavian artery internal to the scaleni, but the danger was too great; ligature external to the scaleni would have involved the tumour. Injections of perchloride of iron (Pravaz.) were not then known, and one might doubt, even if they had been, their efficacy in this case. Brasdor's operation of tying the axillary was useless, as no pulsation in the axillary or brachial could be felt.

Bonnet, rejecting all operative measures, resolved upon using the chloride of zinc paste, to be applied daily to coagulate the blood, arrest hæmorrhage, obtain clot obstruction, and set up adhesive inflammation.

January 6th (thirty-two days after injury).—Application over the tumour of paste of chloride of zinc (Farina and Zinc. Chl. equal parts, mixed into paste with alcohol instead of water), two centimetres in diameter. Caused severe pain and produced a dry eschar, which arrested hæmorrhage.

9th to 20th.—He removed every morning the portion of destroyed skin and reapplied paste.

20th (the fourteenth day).—Pulsation entirely disappeared, as also bruit. Tumour not diminished, but did not seem to increase; this due to the great thickness of eschar, which had eight centimetres diameter, and to the inflammation set up in neighbouring tissues.

25th.—During the night arterial hæmorrhage, which was arrested by rapid application of chloride of zinc and compression. Again hæmorrhage on 27th, 28th, 29th, 30th, and 31st. Life threatened. Each hæmorrhage arrested by the application of the paste. From this time no further hæmorrhage.

From 31st to February 8th one did not dare to remove the eschars; but then he commenced to remove them, followed again by application of paste, and at end of four days exposing the pouch of the aneurism itself, the clot formed of

concentric layers of coagula, of reddish tinge, occupying the centre and all round.

13th.—The excisions of sloughs and successive cauterizations were now stopped; the surface of the exposed aneurism was elliptical, nine centimetres across, and seven in height. On 21st, whole mass detached except at depth. On March 1st, the remainder of the slough came away, leaving a large deep wound, exposing trunks of nerves. Abundant suppuration; granulation; slow recovery. Left hospital on April 20th. The paralysis of upper extremity persisted. No pulsation in axillary, radial, or ulnar.

This case formed the subject of comment at the Societé de Chirurgie de Paris.

In the discussion *Roux* threw doubts as to the source of the hæmorrhage, and as to whether it was a lesion of the subclavian artery, for death would have been immediate.

Maisonneuve remarked that the case showed the destructive power of escharotics on large arterial trunks, without causing hæmorrhage. He recollected presenting to the Society a case where a slough comprised the whole of the femoral artery, and produced by Vienna paste. In another case the ' *acide nitrique mono-hydraté*' was used to remove a cancerous tumour of the parotid region, and on separation of the slough it had included the carotid artery. In neither case was there any hæmorrhage.

Hodgson, at p. 103 of his work on the arteries, describes an instance in which occurred the cure of a large inguinal aneurism by means of sphacelation (see Case xvi of his collection, and the remarks at p. 106).

" The rare accomplishment of the cure of an aneurism by sphacelation, and the exasperated circumstances of the disease, in which alone it can take place, render it an occurrence rather to be dreaded than looked forward to with any hope of a favorable result. The danger attending at all times the sphacelation of so large a surface, and the uncertainty of the process having proceeded to such an extent as to close the artery communicating with the sac, render all ideas of attempting by art a similar event totally inadmissible. In former times, however, the actual cautery was recommended for the cure of this disease; and Severinus relates the history of a large aneurism in the groin, of which, after sphacelation had commenced, he promoted the cure by the application of red-hot irons and caustic powders."

Guthrie, p. 98, says : " The attempt to cure by sphacelation

is attended with so much peril, that if possible it should be prevented by surgical operation."

M. Bonnet of Lyons has certainly had the hardihood to attack subclavian aneurism by this method after it had resisted all other treatment, and he obtained an unhoped for success ; but it was not until after the patient had undergone the gravest accidents, such as repeated hæmorrhages, exhausting suppurations, and excessive pain. Chloride of zinc was preferred on account of its peculiar coagulating properties. Who will again venture upon such a perilous task ? This method is only following out in another or converse way that which nature sometimes adopts for the cure of aneurism, but in this respect she seldom succeeds except in rare instances ; thus there is more or less rapid en-largement, tension of the parts, inflammation and hardening of the tissues, and when long continued, leading to sphacelation of the skin, a dense compact blood-coagulum forming at the same time within the sac and vessel, shutting up its canal, and completely interrupting the course of the blood into the sac. But more frequently it does not proceed so far ; the sphacelation takes place to such a degree as to cause the bursting of the in-tegument and sac, by the detachment of a series of eschars or sloughs, attended with or without hæmorrhages ; and this hæ-morrhage at first is only at small and repeated intervals, so that a cure is still possible should the powers of the patient be suffi-cient to bear the necessary derangement of the constitution con-sequent upon the effects of this perilous process of inflammation and gangrene, but generally, however, the patient dies exhausted from repeated bæmorrhage, or from a sudden giving way of the sac externally or internally (Hodgson).

Section VI.—*On Galvano-puncture in Subclavian Aneurism.*

It is singular that the first case of aneurism in which this treatment was adopted was one of subclavian aneurism, occur-ring in the year 1838. The fact is mentioned by Liston in his history of the case, it being the one in which he afterwards had to ligature the first portion of the subclavian and the carotid in consequence of the failure of this process. The only notes of this proceeding are recorded in the 'Lancet' of August, 1838,

and it is described as having been performed by Mr. Phillips, at the Westminster Hospital.

Liston thus reports the case, and states that he had seen this patient first about six or eight weeks before, at a period when the man was about entering into another hospital for the purpose of having the tumour subjected to treatment by galvanism. The mode in which this was conducted consisted in passing of large suture needles through the tumour; to these needles were attached wires communicating with a galvanic battery. The tumour had become firmer for a time; soon, however, the application ceased to exert any influence, and the tumour began again to increase in size. The man got tired of the proceeding and made application to the University College Hospital. For further details of this case and subsequent operation performed see *infrà,* Case 112.

Since then it was again attempted in a case of supposed subclavian aneurism, but which eventually proved to be an aneurism of the innominata.

The patient was a male, æt. 39, and the disease of seven months' duration, very large, extending as high up as the bifurcation of the carotid, and as low down as the second rib and occupying the two inner thirds of the subclavian. For detailed report of case see page 142 ' Guy's Hospital Reports,' 1869-70.

In this case the galvanic battery was used on February 16th; two needles of a curved form were introduced into the tumour, and a current was made to pass through it, of sufficient strength to coagulate the albumen. This was continued for about ten minutes, and occasioned but little inconvenience, excepting an unusual heat in the part; the needles were withdrawn and merely a few drops of blood followed. On the following day the tumour seemed inflammatory, and he suffered from pyrexia, but this subsided. Ulceration and disposition to slough of the punctures ensued; the tumour became less red, much more solid, and pulsation diminished. The tumour, however, became much thinner at one part, the skin gave way and the tumour burst suddenly. Twisted sutures were used; but the loss of blood was so rapid that the patient almost immediately afterwards expired.

Cockle (' Med. Times and Gazette,' 1863, vol. i, pp. 504, 531, 557) mentions a case in which galvano-puncture was insufficiently tried for aneurism of the ascending aorta and innominata,

supposed erroneously to have been subclavian aneurism. It was that of a male, æt. 45, with an aneurism of six months' duration. The sac was about giving way before the operation; but death took place in a few days after its development from rupture of sac and hæmorrhage.

Ciniselli, 'Sulla Elettro-Puntura nella cura degli Aneurismi, Cremona,' 1856, tabulates two cases of subclavian aneurism, but gives no detail nor any reference, and these are probably that of the above case of Liston and the following one.

The only successful case on record is that of Abeille,—one of subclavian aneurism of the size of a hen's egg and of long duration. It occurred on the left side in a female, æt. 65, and was beginning to increase in size.

CASE 60. *Abeille.*—Size of hen's egg. Under etherization, four steel needles were made to traverse the tumour to a depth of three quarters of an inch and the galvanic pile put in action for not more than five minutes' contact at a time. For about a minute the patient remained insensible, but then immediately cried out and experienced convulsive movements in all parts of the body. The arm of the affected side became especially and extremely violently convulsed. The tumour soon began to diminish, and became more tense and resisting; pulsation in it gradually subsided, and the radial pulse reappeared. This condition lasted thirty-seven minutes, the patient being in a profuse sweat; and no operation ever caused such torture. When the tumour had become hard and deprived of all pulsation, the needles were withdrawn, and cold applications applied, a compress of one kilogramme weight was placed above the tumour on the course of the artery, and maintained for ten hours. On the following day there was slight vibration in the tumour; the radial pulse had completely disappeared; the whole arm, forearm, and hand, cold and engorged, and with sensations of pain and tingling. Venesection on fourth and fifth days, motions of the fingers lost. On the third and fourth days the radial pulse reappeared, but very slightly, and she had intense cephalalgia, requiring venesection, repeated also on following day. The eschars became detached from the site of the puncture, with but little suppuration. From the fourth day the tumour decreased, and on the twelfth had diminished to one half the size; on thirty-seventh day the tumour was no longer prominent, and it entirely subsided at the end of three months. The case was seen two years afterwards; there was no reappearance, and the pulse was rather smaller than on opposite side.

Remarks by M. Abeille.—He thinks that the intolerable pain induced renders the operation inferior to that of ligature, when the latter can be accomplished. Besides, electro-puncture exposes the patient to a greater risk of hæmorrhage, in case of non-success, consecutive upon inflammation and suppuration; it can only be employed in exceptional cases.

CASE 116. *Schuh.*—Male, æt. 39, right subclavian aneurism of six months' duration, extending from larynx to trapezius. On account of the circumscribed space of thrill in a tolerably sized subclavian aneurism showing the opening in the sac to be small, it was considered a favorable case for electricity, although on the other hand it was impossible to control entirely the flow of blood during the working of the electricity. A Bunsen's battery was employed; and two varnished needles with golden heads belonging to the positive pole were passed on the inner side under the tumour, and two belonging to the other pole were passed on the outer side into the under part of the tumour. This was followed by tolerably severe pain, with twitchings as far as the hand. An assistant had compressed the axillary artery. After five minutes the needles of the one pole were thrown out by the movements of the patient. The operation was left off, and a tourniquet was placed on the axillary artery for an hour. In consequence of the short duration of the action of the electricity the needles remained unchanged, and no blood followed either through the punctures or under the skin. The tumour on the following day appeared smaller, and the thrill or whizz had quite ceased; otherwise there was no change in the symptoms, excepting an occasional formication in the tips of the fingers. The punctures suppurated superficially and formed a dry brown crust. About the tenth day the thrill re-appeared and the tumour was resistent and its circumference the same as before the operation. On the eleventh day electro-puncture was again employed, but with only two needles. The pain was less than in the former trial; after seventeen minutes the needles were withdrawn, that on the zinc pole was unchanged and came out easily, a little blood flowed out and a little passed under the skin to the extent of a nut; the other needle was thinned and very much eroded, so that the gold and varnish came off; there was no bleeding from this puncture. This time there was scarcely any change in the aneurism, but, however, pain became developed down the arm, and a feeling of numbness, as also a slight lessening of sensation on radial side of forearm.

For continuation of case see Brasdor's operation. It terminated unsuccessfully.

ADDITIONAL CASE. *Sands* ('New York Medical Record,' Sept. 1, 1868).— A sailor, æt. 19, admitted in the New York Hospital, three months after the formation of a right subclavian aneurism, attributed to the falling off a mast. The tumour was of a very large size, occupying the posterior triangle of the neck, and extending upward to the jaws, and it pulsated through its entire extent. He had contraction of the pupil, probably due to pressure on the sympathetic nerve. It was treated by digital compression of the carotid and distal side of the subclavian arteries carried on at the same time. After twenty-six hours of almost unbearable pain this treatment was given up, and in consequence of the state of the skin where the pressure had been applied on the subclavian, and the increasing size of the swelling, at the end of two months galvano-puncture was performed. A golden-headed needle was introduced into the upper part of the tumour and connected with the positive pole; the negative electrode was placed at the upper end of the sternum. The galvanic current was passed for a quarter of an hour without any untoward result; and was again employed on 7th and 11th days afterwards. Although the tumour became firmer, still it increased, pressed more and more on the surrounding parts, and gave way fourteen days after the last operation. A severe hæmorrhage ensued, and returned in three days, and was

followed by death. The giving way of the aneurism occurred at the spot where the compression had been employed on the subclavian artery. The examination showed the efficacy of the galvano-puncture. At the part where the needles were introduced there was an adherent clot of an inch in thickness. The subclavian was incorporated with the sac in its whole length. The coats of the artery were healthy, except where passing over the first rib, and there adherent, probably due to the compression. About one inch from its origin from the innominata there was an oval opening in the subclavian, one quarter of an inch long, one eighth of an inch broad, communicating with the sac; and at the point where the thyroid axis usually comes off. The attempts to tie the innominata were considered hopeless, as it was covered by the lower part of the sac.

Thus, then, we have only one instance of cure by this means. The object of the process is to provoke the formation of obliterating clots; but this is not to be depended upon, as in many cases of aneurism in which it has been tried the phenomenon of coagulation has not been brought about. Thus in Boinet's collection of thirty-two cases of galvano-puncture presented to the Societé de Chirurgie, Juillet, 1851, in some the galvanism entirely failed to excite coagulation, and in other rare instances the coagulation took place immediately, in from fifteen to twenty minutes, the tumour becoming hard and pulsation ceasing; and in others this consolidation did not occur at once, but the tumour became more doughy, and the true solidification took place later; in others, again, there was no immediate change under the action of galvanism, but there took place, some two or three weeks afterwards, solidification, probably due to the inflammation set up in the walls of the sac.

Richet inquires into the mode of action of electricity on the blood in the sac. He says experience has shown that if electric currents act especially in coagulating the albumen of the blood, as shown in the researches of Regnauld and Broca, they provoke also equally the coagulation of the fibrine, as one may prove by analysing the clots. Hence there results that the clots produced by electricity are not of the same nature as those which are formed spontaneously, the latter not retaining, or very slightly, the albumen in their fibrinous meshes. The clots formed by electricity ought, then, evidently, to be less solid and less resisting; and it is not rare to find in some cases that the tumour which was solidified at first has afterwards become softened. However, one must not think that these clots are incapable of organization, for such has been proved to be the fact in one of Boinet's cases.

Ciniselli gives the result of 14 cases of aneurism treated by this method, and in which inflammation followed; a cure resulted in 2 cases, improvement in 1 case, no effect whatever in 6 cases, an injurious effect in 2 cases, and death in 3 cases. The increase in the size of the aneurism after the operation may probably, in some cases, be due to gas developed by the action of electricity on the blood.

The dangers of this mode of treatment are—1st, hæmorrhage, either primarily induced by the introduction of the needles, or secondarily and consecutive, due to the action of the electricity; and, 2nd, cauterization of the skin, followed by small sloughs around the puncture, due to chemical action on the tissues.

Lefort sums up thus:

"Galvano-puncture has met with some success; it may be applied in the cure of large aneurisms of the trunk, but it is far from having arrived at the degree of perfection which it is susceptible of. Many points have to be cleared up, and we cannot do better than refer to the advice emanating from the Committee of Turin, namely:

"1. To use apparatuses of moderate activity.

"2. To employ thin smooth needles (not varnished, which are useless), and repeat the application rather than increase the number of needles.

"3. To give space to the needles, and place them parallel to each other, the points being more divergent than convergent.

"4. To use interrupted currents, with inversion of the currents, in preference to continuous currents.

"5. Not to allow the negative electricity to pass through any needle without having passed previously the positive current, and without having determined around it the formation of a small blackish areola. To change the contact every two or three minutes, applying the negative pole to the needles first placed in contact with the positive pole.

"6. Not to leave the needles in the sac in the interval between one operation and the other.

"7. Not to repeat the operation, until the effects obtained in the previous one have disappeared, or if there be inflammatory symptoms and ulceration.

SECTION VII.—*On the use of the Subcutaneous or Hypodermic Injection of Ergot in Subclavian Aneurism.*

This has but recently been had recourse to, and the object of this method is to cause contraction of the muscular fibres of the walls of the sac by throwing under the skin an active agent, such as ergotin. Langenbeck was induced to try the effects in one case, in consequence of the success attending such treatment in causing contraction of the uterus; and in this case with benefit. Now, in the first place, we must consider whether an aneurism of the size of a closed fist, and of nine months' duration, has the muscular walls of the dilated artery or sac sufficiently hypertrophied to be influenced by the action of the ergot in contracting upon the contents; and, secondly, whether the muscular coat does not undergo degeneration, and lose its properties in long-standing aneurisms. In this case the patient certainly gained relief, and the circumference of the tumour became smaller and much reduced in size, until a small mass was left.

CASE 48. *Langenbeck.*—This case has already been mentioned at p. 43, under the head of " Treatment by moxa." The aneurism was now of about three and a half years' duration, and of the size of the closed fist, in a man æt. 48. The following is a continuation of Langenbeck's narrative:

January 2nd, 1869.—" I found him in the following condition :—The aneurism had become much larger, and the patient maintained that it had only lately become so. The aneurism was of the size of a closed fist above the clavicle. The pulsation so strong, when feeling the tumour, that it seemed as if the whole would burst. The pulsation was also felt below the clavicle, so that the subclavian must have been much dilated. The pulsation could be seen distinctly at a distance, and causing rhythmical shaking of the head. The sterno-mastoid region, of triangular form, was swelled out, the jugular (supra-sternal) fossa obliterated; the pulse in right carotid not felt, as also right temporal artery. Patient complained of severe pain in the right side, so as not to be able to sleep. He could not lie on his back, but must sit up in bed, with the body bent towards right side, and he could only sleep in this position. The hand was much emaciated, as also the space between the metacarpal bones. He had not been able to write since the appearance of the tumour, not being able to hold a pen between fingers and thumb. The feeling in the course of ulnar nerve was weaker. The last finger-joints were swollen, and he stated that this swollen condition of the last phalanges came on during the getting worse of the aneurism.

On January the 6th I made the first hypodermic injection of 0·03 gramme Extract. Secal. Cornut. Aquos.[1] This injection, as were all the later injections, was performed in the morning, between eleven and twelve, and under the integument over the aneurism. When I saw him on the following morning the patient said he was glad, for he had passed the whole night quietly in sleep, and he thought it due to the injection. On the next day and following one an injection was employed, and the patient could go to sleep on his back, and the pain in the arm was much lessened. The aneurism also pulsated more feebly, and was decidedly smaller. I will not enter into further detail of the case, but remark that, from January 6th to February 17th, as a rule, the injection was used at three days' interval, and about two grammes of ergotin, in doses of 0·03 to 0·18 were injected. The improvement has been progressing steadily. The patient, who had not been able to hold a pen for six months, in the course of the week showed me a paper on which he had written his name, and to-day he told me he had written a long letter to his brother, and the writing was in his usual style. The movements of the hand returned, and he could go about with a stick, whereas when he came to me he had to wear the arm in a sling.

The aneurism still, however, pulsated, but quite differently and less forcibly, and was much reduced; the triangular space between the sterno-mastoid had become natural; still there was some mass left, so that one was unable to pronounce the subsidence of the swelling."

The further report of this interesting case has not yet appeared.

SECTION VIII.—*On Injection into the sac or interior of Subclavian Aneurisms.*

This has been performed three times, and with failure in each case, and more than failure; for in one instance (Case 54) it was followed by immediate death; in another (Case 53) hæmorrhage took place through the punctures, leading to death by exhaustion in thirteen weeks. The third case will be found as No. 115, under "Distal operation for subclavian aneurism by ligature of the axillary artery." The injection was here tried, but no good result was accomplished up to the time of the operation of ligature; it was again employed subsequently and failed.

CASE 54. *Mott.*—This case is merely casually alluded to, and

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[1] The solution consisted of Boujean's Extract. Secal. Corn. Aquos. 2·5, Spir. Vin. Rectific., Glycerin., āā 7·5, and the syringe used held exactly 0·18 grammes of this solution.

no actual record is to be found, the only statement being that immediate death followed the injection of a subclavian aneurism.

CASE 115. *Pétrequin.*—Male, æt. 59; aneurism of size of small apple, and of three months' duration. Distal ligature of the axillary was performed, for details of which see the operation further on, under head of " Distal ligature in subclavian aneurism." At the same time he undertook the injection of the sac. The account runs thus :

After tying axillary on distal side of sac, attempted to inject the tumour, but failed in getting the canula into the sac. On the third day, the instrument being repaired, a puncture was made externally, a little behind and about two fingers' breadth above the clavicle, and the canula introduced, and about eight to ten drops of the perchloro-ferro-manganate injected, the end of the canula being turned about in three different directions. In injecting care was taken in making compression on the arteria innominata, and continued for ten minutes after the injection. It was perceived that the tumour had become sensibly hardened. Pulsation ceased in the sac, and it became hard, without pain or inflammation. He now had an attack of bronchitis and threatening pneumonia, and erysipelas of arm. These subsided and the wound suppurated. On the tenth day abundant hæmorrhage from the ligature wound; compresses soaked in perchloride of iron; fresh hæmorrhage on following day. The flow of blood could not be entirely checked, and he died on 13th day exsanguineous.

CASE 53. *Quoted by Forbes.*—Wm. B—, æt. 36, a German, and a farmer by occupation. While working in hay-field with a pitchfork, on the 28th of August, 1858, he felt something give way about his shoulder-joint on the right side. He had pain throughout the entire extremity of that side, which after a few hours localised itself under the middle of the collar-bone. A pulsatory tumour made its appearance over the middle of the clavicle, and on the 12th of September he left the farm and came to Philadelphia. His surgeon pronounced it to be an aneurism, and advised that no time should be lost in seeking further aid, in view of an operation, as the tumour was now as large as a hen's egg, and increasing rapidly in size. Upon further consultation it was concluded not to operate. The tumour grew rapidly, and ten days after his arrival in the city he sought the advice of a German physician, who proposed to him the injecting of perchloride of iron into the tumour as his only hope. This operation was accordingly performed. Three distinct openings were made in the summit of the tumour, but what quantity of the perchloride of iron was injected I could not ascertain; nor could I learn what amount of hæmorrhage occurred when these openings were made. Ten days after the operation of injecting was performed the surgeon ceased his attendance, and on the following day the patient sent for Dr. Freeman, of this city. The tumour was found to be larger than an ostrich's egg above the clavicle; the margins of the three openings were sloughing; there was no pulsation in any of the vessels of the limb; still it was warm, œdematous, and entirely deprived of sensation. The

patient was quite anæmic from the hæmorrhage which had occurred since the German physician had ceased to visit him. From the man's description the first hæmorrhage appeared to have been a general oozing from the opening farthest from the clavicle, and was stopped by an application of cold cloth. The second hæmorrhage occurred some six hours later, and was only stopped by the patient fainting. He was ordered an anodyne, and a little stimulus with broth and other liquid nourishment, and the cold to be constantly applied. On the following day the patient was more comfortable. Acetate of lead, acetate of morphia, and tinct. digitalis prescribed; cold cloth wrung out of lead water and laudanum to be applied.

The following day the aneurism had increased very much in size. He had a constant cough, and the sputa tinged with blood, and at times a good deal of pus. He had another hæmorrhage during the night, became very anæmic and much weaker. He was most carefully watched, but bleeding more or less every day. He gradually sank.

On December 3rd I was asked to see him. The tumour then extended from the angle of the right inferior maxilla to the acromion, and from near the lower cervical spinous processes posteriorly to beyond the interclavicular space anteriorly. Head pushed over to one side; breathing very difficult. The three orifices had all merged into one large orifice at the summit of the tumour, through which the aneurismal clot was now emerging, and its surface undergoing decomposition. He complained a good deal of cough, and a sensation of oppression at the summit of the thorax, the tumour evidently pressing against the lung, the phrenic and pneumogastric nerves and trachea.

The clot seemed to be pressed from below upwards, not spasmodically, as if by the heart's action, but continuously and quite forcibly, thus causing it to protrude through the orifice at the top of the tumour, like a hernia, thereby preventing hæmorrhage; yet there was at times a slight oozing of blood mingled with the pus of the breaking-down clot. The whole tumour, from base to summit, was covered with small shreds of lint, and thickly painted with collodion. Anodynes, digitalis, and a nourishing diet ordered. He bled no more, but continued to sink, and died from exhaustion, just thirteen weeks after he felt something give way in the right shoulder.

Autopsy, twenty-four hours after death.—The innominate artery was traced upwards. The tumour was pressing upon its upper part, and likewise against the right carotid, compressing it against the lateral surface of the bodies of the lower cervical vertebræ, and thereby interfering materially with its functions, together with those of the pneumogastric nerve, and internal jugular vein. The sac of the tumour was now opened, and the huge clot removed. The sac consisted only of the external coat of the artery, thickened a little by inflammation. After the removal of the clot a *lacerated* opening, about a quarter of an inch in extent, was found to exist in the internal and middle coats of the third or last division of the subclavian artery, viz. the part existing between the external border of the scalenus anticus muscle and the inferior border of the first rib. The blood had dissected up the external coat of the artery, and had extended down the axillary artery a short distance, and had proceeded upward posterior to the scalenus anticus muscle as far as the bifurcation of the innominate artery, embracing all the branches of the subclavian, so that the first part of the vertebral, the external

mammary and the superior intercostal, and the whole of the thyroid axis, were denuded of their external coat by the blood dissecting it off. The blood had dissected up so much of the external coat of the internal mammary artery as to have formed a tumour as large as a hen's egg, which pressed against the pleura and the upper and anterior part of the lobe of the right lung, causing it to break down, and giving rise, in part, to the pectoral symptoms so prominent a few days before death. The blood had also followed up the branches of the thyroid axis toward the acromion, and upward toward the thyroid gland, and had caused extensive pressure against the phrenic nerve and pneumogastric nerve, and the internal jugular vein, by its extraordinary dissection of the external coats.

There was a slight degeneration in the aorta, just at the giving off of the coeliac axis, where there existed a very small atheromatous deposit. Lungs healthy, except at the summit of the right, where the tumour had pressed.

Had this man been seen a few hours after the accident the artery could have been ligated a little above the lacerated wound, just at the margin of the scalenus muscle.

The character of the lacerated wound in the artery was peculiar; it extended in the direction of the long axis of the vessel, and not around it. It was on the anterior surface of this vessel, and was small in extent. The innominate artery was very short, and all the branches of the subclavian came off from the first portion before passing behind the scalenus muscle.

The injecting into small aneurisms of a fluid capable of coagulating the blood in the sac has sometimes led to their cure ; but in the majority of such instances the cure has been effected by the inflammation set up, and not by the direct coagulation of the blood. Its application to large aneurisms, and more especially the subclavian, is fraught with the highest danger. In the first place there is always great difficulty in applying pressure on the artery on the cardiac side—a most vital preliminary step to injecting ; next, the quantity of fluid to be injected must be sufficient to coagulate the contents, and hence liable to set up severe inflammation in the sac itself, leading to suppuration and its attending consequences.

The fluid generally preferred is the perchloride of iron, which forms, with the blood, a ferro-albuminoid combination, in the form of a solid and resisting body, which, in some instances, lies innocuous in the sac, but in the majority acts as a foreign body, setting up irritation, inflammation, suppuration, gangrene, and hæmorrhage.

The dangers attending consist in—1st, hæmorrhage from the punctures, which may ulcerate, as in Forbes's case. 2nd. Inflammation and suppuration, either within the sac, or in the

tissues outside. 3rd. Sloughing of the integuments over the sac and gangrene.

This treatment is condemned by nearly all surgical writers.

SECTION IX.—*On Acupressure in Subclavian Aneurisms.*

The only experience in reference to this practice is to be gained from the solitary instance in which it has been performed. Dr. G. H. Porter, of Dublin, has published a detailed account of this interesting case in the ' Dublin Quarterly Journal of Medical Science' in November, 1867. We have thought fit to introduce this case here, and have curtailed the particulars as far as possibly could be done without detracting from its value. It stands as No. 55 in our table.

Large aneurism of the right subclavian artery treated by acupressure on the first stage of the axillary artery, and subsequently by direct pressure on the arteria innominata, unsuccessfully.

Patrick G—, æt. 43, a labourer, admitted into Meath Hospital, June 11th, 1867. He was a strong, healthy-looking man, and said he had never been sick a single day until fourteen months previously, when he noticed a small tumour above his right collar-bone. This swelling gradually increased, and the following symptoms were present on his admission to the hospital :—a pulsating tumour about the size of a duck's egg was seen above the right clavicle. It rested inferiorly on this bone, and its long diameter passed from the edge of the sterno-mastoid muscle outwards to the extent of three and a half inches towards the trapezius. In the perpendicular direction it measured two and one eighth inches. It had a strong eccentric pulsation, but was at the same time very compressible. There was no pain in the tumour. The external jugular vein was much distended in the neck above and half way over the aneurism. There was a loud *bruit de souffle* audible in the tumour, extending towards the arch of the aorta. The radial pulse was much weaker than that of the left side. He felt numbness and slight pain in his forearm and hand, chiefly along the inner edge. His right hand was always a little colder than the opposite one. At the upper and inner part of the dilatation one spot appeared much thinner than the remainder of the sac. The man was not aware of having ever met with any injury, but had always worked very hard. When the tumour first attracted his attention it was not larger than a small nut, and he could make it disappear by pressure with his finger. He had been for six weeks in another hospital in this city, where pressure on the tumour had been tried, but without benefit. He had also a small aneurism of his right femoral artery just below Poupart's ligament. His muscular system was in a good condition on admission. He slept well, and had an excellent appetite. His spirits were not in the least depressed, but, on the contrary, his manner was cheerful and

hopeful. He was well aware of the serious nature of the malady, and entreated that if there was any chance of relief by an operation that chance should be given him.

Everything seemed unpromising. The serious complication of the second aneurism, and the probability of disease being present in the man's aorta, rendered the case almost hopeless—then, again, the idea of ligaturing a vessel on either the cardiac or capillary side of the tumour, carried with it the dread of secondary hæmorrhage. It occurred to me that this was a legitimate case in which I might attempt the occlusion of the artery by acupressure at the distal side.

On June 26th, 1867, 10 a.m, I laid bare the axillary artery in its first stage, placed a silver probe under it, and bridged over the vessel with a loop of wire after the manner of Simpson's 4th mode of acupressure. (Here follows a detailed description of the difficulties of the operation.)

This immediately obliterated the pulse at the wrist, whilst the aneurismal tumour diminished nearly one half in size and its pulsation was weaker. A flannel bandage was then applied from the hand to the axilla, and a small bladder of ice placed on the tumour.

28th.—No change of temperature in the limb. Passed a good night. Radial pulse was felt faintly; tumour reduced much in size; the pulsation was weaker, and the bruit in the aneurism was two thirds shorter. The aortic bruit had almost disappeared. At half past 3 o'clock p.m., just fifty-three hours after its application, I removed the probe and wire, and not a drop of blood followed.

30th.—The tumour continued in much the same condition, especially as to size. It was decidedly more firm, the pulsation being transmitted to the finger evidently through a thicker stratum of fibrine. A small chamois bag containing shot was kept on the aneurism alternately with a bladder of ice, and the wound was healing fast.

The history of this case from day to day would be tedious. The tumour again appeared to enlarge and the pulsation to grow as strong as at first; the only marked change being a greater amount of solidity. The wound was perfectly healed on the 17th of July, and the man was out and walking about the grounds of the hospital.

Every circumstance was now weighed as to future measures; amputation at the shoulder-joint, injection, galvano-puncture, manipulation, the introduction of numerous coils of fine wire, were all discussed and laid aside. Now there only remained the chance of shutting off the circulation on the cardiac side. The ligature I made up my mind not to use, but the idea of acupressure in some form I felt disposed to adopt.

It appeared, on careful examination, that the first stage of the artery was sound and the arteria innominata not enlarged.

On July 31st, 10 a.m., I laid bare the arteria innominata and passed L'Estrange's needle under it, slowly and carefully round the vessel, and on removing the handle, the second blade was made to slide down on the artery somewhat in the manner of a lithotrite, and was screwed slowly home by means of a little nut. The pulsation in the tumour became weaker and weaker as the blades were being approximated, and at last ceased when they were brought closely together. (Here is a minute description of steps of operation.)

The aneurism reduced very much in size. A small bag of ice was put on the tumour.

12.30 midday.—He complained of pain in the dorsal region of his spine; he also felt pain in swallowing, and said there was a " great catch" where the instrument lay; his breathing was perfectly free. Pulse 84, and the bruit had disappeared from the tumour.

3 p.m.—A slight pulsation felt in the aneurism. Ice constantly applied.

August 1st.—Slept several hours during the night. Still complained of pain when he swallowed. The tumour was harder and smaller, but still had a decided pulsation. At 1 p.m. I screwed the instrument tighter, which arrested the pulsation. At 10 p.m. pulsation had returned.

2nd.—Slept six hours without being disturbed. Still complained of pain in swallowing. His spirits were excellent. The wound looked most healthy. Tumour pulsating. Small bladders of shot and ice were placed occasionally on the tumour.

At 9.30 p.m. the instrument was removed; the blades having been separated, it was easily turned out of the wound. Pulsation returned immediately to the same extent as before the operation. The tumour was certainly more firm, but resumed its former size; the pain in swallowing ceased almost immediately; the ice and shot were kept to the swelling. Ordered acetate of lead in large doses.

4th.—No change in symptoms, and it would be tedious to relate his daily condition.

9th.—The wound was healing in a most healthy manner; the tumour in the same state. He had become restless, and when the nurse left the ward he got out of bed and went to the water-closet.

9.30 p.m.—The patient sat up in his bed, when a gush of arterial blood burst from the wound. The resident pupils were with him almost immediately, but they found that he had lost a large quantity of blood. They instantly plugged the wound with sponge and sent for me. I saw him a few minutes before ten; the bleeding was perfectly arrested; I merely added compresses and fastened all on with adhesive plaster and bandages. Ice was kept over the tumour and upper part of his chest.

10th.—Slight returns of hæmorrhage occurred during the day, but were easily restrained. 8.30 p.m. a violent gush of bleeding took place, sweeping away all the plugging, and he expired immediately.

Post-mortem examination, fourteen hours after death.—His chest was carefully opened and the apex of the right pleural cavity was found to be perfectly healthy. His lungs were also in a normal condition. His heart was somewhat large, and felt a little softer than was natural. The arch of the aorta was larger, but not dilated into any aneurismal pouch; a few atheromatous specks were visible on its lining membrane. The arch and its vessels removed, and the drawing fairly represents the parts concerned. (A plate accompanies the case.)

A little sloughy aperture just below the bifurcation into right carotid and right subclavian marks the source of the fatal hæmorrhage. In the tumour some layers of fibrine were observable. At the point where the acupressure was applied to the axillary artery the vessel was not completely occluded, but narrowed. The head and abdomen were not opened.

Remarks.—1st. That the return of the pulsation in the tumour arose from the slipping of the artery from the jaws of the compressor, forming in consequence a small channel through the vessel beyond the extremities of the blades.

2nd. That by screwing the instrument tightly to arrest the current of blood, I made undue pressure on the anterior portion of the artery, and thus produced the slough.

3rd. That an artery may be *acupressed* for several hours with perfect safety.

4th. That the blades of the compressor were too short and not sufficiently curved for a vessel of this size.

I believe if I had merely passed an ordinary aneurismal needle under the artery and looped over the vessel with a piece of wire, the result would have been favorable.

Section X.—*On the Attempts at Operations for Cure of Subclavian Aneurism.*

We have introduced this subject as a separate paragraph instead of detailing the cases under the Sections on ligature of that vessel or portion of vessel which it was the intention of the operator to tie, but which he did not succeed in tying. These attempts, of course, must have been attended with a great deal of manipulation, and as the sac was the chief source of difficulty, the contents thereof must have undergone some change, and hence we might almost have added these cases to those adverted to in Section IV, on " Manipulation." However, we will analyse their results separately ; they comprise seven cases—six males and one female; five died; one recovered, and with an unexpected cure; in one the result is not known.

In four of the cases the attempt was made to tie the subclavian after passing the scaleni (Cases 61, 65, 66, and 67, all males, one left side. State of sac, see p. 87, ' Guy's Hospital Reports,' 1869-70.)

Case 61. *Sir A. Cooper.*—The following account is taken from a letter by Dr. Mott, of New York, who was present at the operation, and who communicated it to the ' New York Medical Reporter.' It is very cursorily alluded to in the English journals.

On the 20th of August, 1809, a man æt. 40 came to Guy's Hospital with a tumour occupying the whole of the left shoulder, the greatest part of the clavicle, and extending under the pectoralis major muscle. It was not red upon the surface, but very hard and without any distinct pulsatory motion; when it was very small and of about six months' duration, Astley Cooper said he saw it and there was no pulsatory motion to be discovered, at least only such motion as the subclavian artery beneath might communicate to a tumour situated immediately over

it. The tumour, however, Astley Cooper fully believed to be an aneurism of the subclavian artery, and when, upon examination, an aneurism was discovered in the femoral artery, just below Poupart's ligament, the smallest doubt did not remain in the mind of any person present as to the nature of the tumour in the shoulder, and that it was an aneurism of the subclavian artery.

The situation of the man being truly painful, and it being evident that the disease must prove in a short time fatal if no operation were to be performed, Astley Cooper determined to make an attempt to take up the subclavian artery just after it had passed the scaleni muscles. This would appear to many to be a cruel and unwarrantable attempt to save life, yet, as Astley Cooper very properly observed to me, it could only shorten his days a little to attempt the operation, and it was possible it might succeed, though it had never before been performed.

The operation was attempted, and after keeping the man on the table for one hour and fifty minutes Astley Cooper desisted from any further attempts, saying it was impossible to accomplish it, and even if it were then possible, after so much violence had been done and the patient so much exhausted, it would not be safe.

He complained of extreme pain all over the shoulder and arm, occasioned, no doubt, by the violence done to the large nerves going to form the brachial plexus. A considerable degree of fever ensued the day after the operation, which very much increased, attended with high delirium, though venesection, purging, and sudorifics were assiduously used, and on the sixth day from the operation he died.

Upon examining the body after death the first two ribs were found to be destroyed, and a portion of the upper lobe of the left lung was adhering to the aneurismal sac; the sac was large, and contained large coagula of blood; it had thrust the clavicle very much upwards. Astley Cooper took out the part, very carefully preserving all the vessels connected with it, but no account has been given of the preparation.

He said to me, " I am suspicious that in this operation the thoracic duct must have been divided, as it was on the left side, though I did not think of it at the time of the operation, nor before it."

CASE 66. *Lawrence.*—This case is merely casually alluded to in a lecture on subclavian aneurism. There is no detail, and merely a statement that he had a male patient in his private practice who had a subclavian aneurism of the size of half an orange, for which he made the attempt to tie the subclavian in its outer third, but that he failed in doing so in consequence of a pouch extending over the seat of the operation.

CASE 65. *Cusack.* ('Dublin Journal,' vol. xvi, 1840, p. 332. Diffused aneurism of the left subclavian artery, seven weeks. Died tenth day, hæmorrhage.)

Mr. Cusack exhibited a specimen of this disease. The lesser pectoral was expanded over a large mass of coagulated blood, which filled the axilla, extended along the clavicle towards the sternum, and diffused itself among the muscles and cellular tissue of the arm and side; the artery was pushed forwards by it so as to render it impossible to pass a needle round it without entering the sac. The sac had burst into the axilla. The pericardium was found to adhere to the base of the

heart, and the arteria innominata and left carotid presented numerous small aneurismal dilatations.

Seven weeks previous to death the patient first complained of pain in the arm, and became sensible of the existence of a pulsating tumour in the axilla. When Mr. Cusack saw him the pulse at the wrist was almost imperceptible; the aneurismal sac had given way, and he was suffering the most intense pain.

The usual operation for securing the subclavian artery in its third stage was attempted, but upon endeavouring to pass the needle round the vessel the aneurismal tumour was penetrated; an alarming gush of blood took place, which was arrested by plugging the wound with sponge. The man survived the operation for ten days; his death was then occasioned by a fresh effusion of blood into the axilla.

CASE 67. Surgeon's name not stated ('Lancet,' April 5th, 1834).—A man, æt. 42, has just expired in St. Thomas's Hospital on whose body an attempt was recently made to tie the subclavian artery. The man was under the hands of the operator nearly *four hours.*

Admitted on March 22nd; died on March 29th.

In three cases the attempt was made to tie the innominata.

CASE 62. *Porter.*—Male, æt. 47. Aneurism of two and a half years' standing. The history of the case is shortly this :—He had been a labourer, not employed in any particularly hard work, nor was he sensible of having ever received the smallest injury. About two and a half years ago he perceived a small kernel-like tumour above the middle of the right clavicle, which was not painful, and increased but very slowly. It gave no uneasiness at first, and the patient states that it was only within the last twelve months that he experienced numbness or pain in the arm. He also stated that its growth had in general been rather slow. Large pulsating tumour on right side of neck, of an oval form; its anterior edge resting on the trachea, its posterior extending beyond the edge of the trapezius muscle; it passes upwards more than half way on the neck, and its inferior margin rests upon the clavicle, which bone it seems to have slightly depressed above the sternum, and at the sternal extremity of the clavicle is a space of about a finger's breadth unoccupied by the tumour. The transverse measurement of the tumour is five inches and seven eighths; in the perpendicular direction it is three inches. It is hard, firm, and is not diminished by pressure to any extent worth remarking. The external jugular vein is seen to cross it obliquely in a swollen and varicose condition, indicating the existence of some obstruction to the circulation in the subclavian vein. The *bruit de souffle* is only heard distinctly towards the external edge of the tumour. The patient complains of great pain in the tumour, but it has not advanced forwards sufficiently to interfere with either respiration or deglutition.

He complains of numbness and pain in the forearm and hand, chiefly towards the ulnar edge of the arm, and in the middle, ring, and little fingers. All the fingers are aduncated, and the hand is blue and colder than the other. There is no pulse at the wrist, nor can the artery be felt at the bend of the right arm. Heart regular; respiration natural.

The tumour was examined very minutely, with a view to ascertain whether there was a possibility of securing any artery at its cardiac side, and it was found that the pulsation could be distinctly felt nearly as far forward as the anterior edge of the mastoid muscle, and so low in the neck as to come within a finger's breadth of the sternum. It was, therefore, determined that, independent of the difficulty and danger of tying the subclavian artery before it has reached the scalenus muscle in ordinary cases, in this one it appeared to be impossible, and therefore, if any operation was to be undertaken, it should be that of placing a ligature on the innominata.

In consultation it had been suggested to him to tie the artery at the distal side of the tumour; but he had declined it, principally on the following grounds:— 1st, that the success of this operation in subclavian aneurism had not, in his mind, been sufficiently established; and, 2nd, that whatever could be accomplished by it had in all probability been done by the pressure of the tumour, no arterial pulsation being traceable beyond the aneurism. He therefore determined to place a ligature on the innominata.

Detail of operation.—Unsteadiness of patient; he could not be prevailed upon to be silent for one moment, whilst at every cry that he uttered the trachea was forcibly pressed against the posterior surface of the sternum. As the operation was proceeded with towards the right of the vessel the difficulties increased. No limit could be found to the artery; it appeared like an immense pulsating aneurismal sac, rough and uneven to the touch. *Compression on the innominata was now tried, and it stopped the pulsation in the tumour,* showing that the aneurism was one of the subclavian artery, but what the nature of this enormous tumour might be, passing deeply below the clavicle and behind the ribs, closely connected with the innominata and the portion of the subclavian within the scalenus, did not so clearly appear. It might have been a dilatation of these vessels, caused by the pressure of the tumour; but the circumstance of being enabled to control its pulsation made against that idea, for compression could not be applied to even a quarter of the vessel so dilated. It might be that an aneurism of the aorta existed, distinct and separate from that of the subclavian, and pushed itself upwards in close and immediate connection with the innominata; but the extraordinary regularity of the circulation everywhere but in parts influenced by the subclavian tumour would scarcely warrant a belief that the arterial system was so extensively engaged. Again, it seemed possible that the aneurism of the subclavian might have taken this extraordinary direction into the chest, and under that idea considerable exertion was made to get beyond it, and reach a healthy part of the artery nearer to the aorta, in order to throw a ligature round it, but it was impossible, and after the most painful exertions during an hour and a quarter the operation was of necessity abandoned.

The evening of operation.—Free from uneasiness; no pain of any description; passed a good night; pain and numbness of arm no longer felt; pulsation in tumour diminished.

Ordered Tr. Digitalis t. d. Most perfect quietude. Ice to wound and tumour. No inflammation followed. Wound suppurated and granulated. Able to get about at the end of four weeks. Pulsation in tumour same as before operation, after leaving off digitalis and ice.

In a month subsequently the tumour had gradually diminished, and was not one quarter the size, and the pulsation scarcely perceptible. Health excellent.

"The tumour gradually diminishes; it is not a quarter the size it was on admission, and the pulsation is scarcely perceptible. He is recovering both feeling and power in the arm. His health is excellent, and altogether he seems as well as if he had never been the subject of so painful and perilous an operation."

In a course of lectures delivered 1839-40, and published in a separate work, at p. 77 he thus alludes to this case :—" The tumour entirely disappeared. The man's health and strength were so completely restored that he was able to return to his former occupation as a day labourer in the country, and I believe he is alive and well at the moment I write."

CASE 63. *Key* (case quoted by Crisp, p. 206).——Mrs. —, æt. 46, admitted into Guy's Hospital on April 25th, 1844, in consequence of a small pulsating tumour, about the size of a pigeon's egg, above the right clavicle. She is a greengrocer's wife, and has been accustomed to use the right arm a great deal in weighing vegetables, coals, &c. This swelling was first observed three months since. She complained of what she called rheumatic pains in the right arm, but her general health has been good. The pulse at the wrist about 80, and both radials beating with the same power; the left, perhaps, a little more feeble than the right. No bruit can be detected over the tumour, and the sounds of the heart are natural.

Drs. Addison and Hughes believed that there was a slight dulness on the right side, but from what cause it was difficult to say. Dr. Hughes suggested that the right bronchus may be pressed upon by an aneurism of the innominata, but this was only conjecture.

Mr. Key decided on passing a ligature round the innominata. This was attempted, but without success. He discovered what appeared to be an aneurismal sac behind the subclavian, but its exact situation could not be ascertained. In the evening she was restless and wandering. Pulsation in the sac was wanting on the second day.

On the seventh day hæmorrhage from the wound, but this was soon arrested.

On the eighteenth day going on tolerably well. The sac had increased in size, and there was much pain in the right arm.

On the twentieth day breathing became difficult, which gradually increased. The sac continued to enlarge, and at length, pressing on the trachea, stopped respiration.

She died on the twenty-fifth day after the attempted operation.

Inspection.—Heart and valves normal; ascending and descending aorta studded with cartilaginous and atheromatous deposit; a small aneurism was found in the descending thoracic aorta; the carotid was perfectly healthy; the innominata, immediately after its origin, formed an oblong aneurismal dilatation, occupying the whole extent of the artery; a contraction had taken place in the sac where it passed between the scaleni, or probably the artery remained of its natural calibre at this spot in consequence of the obstacle to its dilatation caused by these

muscles. The *subclavian* was then dilated, so as to form a thumb-like process. The sac was filled with dense, firm coagula, leaving a small channel for the passage of the blood. The coagulum was supposed to have formed after the operation, from inflammation of the vessels. Death appeared to have been caused by pressure on the trachea.

CASE 64. *Hoffman and Post's case.*—Although described in works as a separate case occurring to each operator, yet this is one and the same case, although narrated by each surgeon irrespective of the other. It was the case of a negro, æt. 63, who had a subclavian aneurism of spontaneous origin and of five months' duration. It had a circular basis of five inches, and extended chiefly below the clavicle, and allowed the fingers to be pressed in between it and the sterno-mastoid muscle.

An exploratory operation was performed, to determine the condition of the subclavian artery and the innominata, and with the intention of tying either of the arteries if it should be in a healthy state. The subclavian was found diseased, and the innominata so much enlarged and involved in the general disease that it was deemed inexpedient to apply a ligature to either of these vessels, so that the operation was abandoned. The operation was attempted on October 26th, 1839, and death resulted from exhaustion on the 19th January, 1840.

The preparation is in the New York Museum, with the following particulars attached to the case:

"'Catalogue Pathol. Cabinet, N. Y. Hosp. Museum,' p. 288.

" No. 630. Aneurism of right subclavian artery. Taken from a stout negro, æt. 63, in whom it commenced spontaneously five months previously. The tumour, which was chiefly below the clavicle, was not at all prominent, but extended over a circular base of five inches in diameter, and allowed the fingers to be pressed in between it and the sterno-mastoid muscle.

" *Dr. Hoffman* exposed the innominata, but did not ligate it, owing to the vessel being too much diseased. Patient died from exhaustion three months later.

"Autopsy revealed numerous atheromatous deposits in the aorta and innominata, together with slight enlargement of the latter. The first sac upon the subclavian artery was not over an inch in diameter, and began at about one inch beyond the great branches of the subclavian artery. Immediately beyond the first sac was the second, six inches in diameter, containing layers of coagula, and involving in its walls the axillary nerves. At two inches from the upper end of this large sac there emerged the descending brachial artery, and from this point backwards to the beginning of the first sac no artery could be traced."

SECTION XI.—*On the Surgical and Operative Measures adopted for the Cure of Subclavian Aneurism.*

In early times subclavian aneurisms were associated and classed with other aneurisms occupying the root of the neck, viz. those of the innominata, aorta, and origin of the carotid. These aneurisms were seldom individually noticed, and no great atten-

tion was paid to their nature or cure until they had attained considerable size, and when forming extensive tumours occupying the neck, chest, and axilla. But as the knowledge of their early development began to be extended by accurately investigating the true seat and source of the aneurism, operative measures commenced to be had recourse to. Clinical observations led to the detection of aneurisms of the subclavian, apart from those of the innominata, aorta, and carotid; and anatomy showed that the subclavian artery might be ligated in any part of its course without interfering with any vital structure.

The third portion of the artery was that first attempted for axillary aneurism; the second portion was tied where the aneurism had extended close up to the scalenus muscle; and ligature of the first portion was first put in practice by Colles for a subclavian aneurism. Since then ligature of the arteria innominata has been advocated and performed by Mott for a subclavio-axillary aneurism. However, the operation in the innominata and the first portion of the subclavian proving so fatal in these aneurisms, surgeons of more recent date thought it essential to combine ligature of the carotid with ligature of the first portion, but with no better success; and, again, the subclavian, carotid, and vertebral have been secured with like fatal results. Some have even recommended ligature of all these vessels, together with the other branches of the first portion of the artery.

These methods thus proving so disastrous, it was considered requisite to try a safer plan by adopting ligature on the distal or capillary side of the aneurism, as suggested by Brasdor and Wardrop; but here also failure has been the result. As a last resource, amputation at the shoulder-joint has been suggested, and this has been successfully performed in one case of well-marked subclavian aneurism.

We propose, therefore, entering upon each class of cases operated upon, according to the several modes which have been adopted, and we shall take them in the following order:

A. Ligature on the proximate or cardiac side of the aneurism:

1. Ligature of the third portion of the subclavian artery, including that of the second portion.
2. Ligature of the first portion of the subclavian.
3. Ligature of the arteria innominata.
4. Ligature of the carotid.
5. Ligature of the first portion of the subclavian and of the carotid.
6. Ligature of the first portion of the subclavian, carotid, and vertebral.
7. Ligature of the innominata, carotid, and vertebral.
8. Proposed ligature of the innominata, carotid, vertebral, mammary, and the three branches of the thyroid axis.

B. Ligature on the distal or capillary side of the aneurism, commonly called Brasdor and Wardrop's operation.

C. Amputation at the shoulder-joint.

In giving an abstract of the cases, we have deemed it essential to embrace every important fact in a comprehensive whole, and we have found it necessary not to curtail them too much, for a large mass of valuable material is to be found in each individual case, and although pretty freely made use of in these statistics, yet they contain besides a great deal worthy of consideration.

A.—Ligature on Cardiac Side of Aneurism.

1. *Ligature of the third or second portion of the Subclavian Artery in Subclavian Aneurism.*

When we consider the short course of the subclavian artery in the external third, viz. where extending from the outer border of the scalenus anticus muscle to the lower border of the first rib, we should hardly expect to find an aneurism in this limited space, where there would be sufficient room to place a ligature on the artery on the cardiac or proximate side of the aneurism; yet there are undoubted cases fully proving the possibility of the occurrence. We have three instances of the kind—Cases

76, 77, and 79. In one of these it was owing to an abnormal length and deviation of the artery, arising from spinal deformity; in another it necessitated the partial division of the scalenus muscle;[1] and in the third it involved the including in the ligature one of the trunks of the brachial plexus.[2]

However, we have collected and arranged under this Section twenty-one cases; and we must bear in mind the reasons why we have admitted into this category cases which were not strictly *bond fide* cases of subclavian aneurism, which reasons we have freely explained in the 'Guy's Hospital Reports,' 1869-70, pp. 50 and 51. We have, in fact, four distinct classes of cases here included, all more or less materially affecting the question of ligature of the third portion of the artery, where this part of the artery has been more or less involved in aneurismal disease.

1st. We have the true genuine subclavian aneurism—Cases 76, 77, 79.

2nd. Aneurisms arising from the confines of the subclavian and axillary arteries, just where the main trunk is passing over the lower margin of the first rib (a most frequent source of origin). These, when extending into the axilla, are called axillary, and when mounting up above the clavicle are called subclavian, and when occupying both sites are called subclavio-axillary; hence the discrepancies in the several statistical collections of axillary and subclavian aneurisms by Le Fort, Koch, Norris, Porta, Crisp, and others. (See Cases 72, 73, 84, 86, 87, and 88.)

3rd. Fusiform aneurisms or dilatations affecting the axillary chiefly, but having the upper spindle-shaped end of the aneurism involving the subclavian artery, even as far as the

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[1] We have thought it advisable to incorporate the cases where ligature of the second portion was performed with those of ligature of the third portion, inasmuch as in all the three and only instances of this operation undertaken for subclavian aneurism (Cases 71, 76, and 80) the division of the scalenus anticus muscle was merely an extension inwards of the operation for the external third. There was not room enough to apply a ligature at a sufficient distance from the aneurism without a partial or complete division of the muscle. However, we shall again refer to this subject at the end of this section.

[2] Cases 9 and 52 are also instances of aneurism occupying the external third of the artery, and in which a ligature might have been applied on the artery external to the scalenus muscle, should occasion have required.

outer border of the scalenus muscle, as in Cases 70, 71, 75, 80, and 83.

4th. Aneurisms of the axillary artery complicated with a diseased and dilated condition of the subclavian artery, as in Cases 74, 78, 82, and 85.

We will now analyse the 21 cases of ligature of the third portion of the subclavian. There are 9 recoveries and 12 deaths.

Let us first take the nine cases of success; these are numbered Cases 72, 76, 77, 79, 80, 82, 86, 87 and 88 in our Tables, of which the table on next page is an epitome:

Six of these cases occurred on the left side and three on the right. We will take the six cases on the left side first.

It is singular that the only two females in which this operation was performed had true subclavian aneurisms, and in both the aneurism occurred on the left side.

Both patients were young women, the one æt. 21 and the other æt. 30; in both the disease was attributed to severe muscular exertion, or rather the overstretching of the artery, although in the one case there was an abnormal displacement of the vessel, as it was more arched and elongated by a spinal curvature, which rendered it more exposed to external injury; still, in both instances the aneurisms were not seated in the usual place where one would expect to find an aneurism arising from overstretching of the artery, viz. lower down over the first rib, towards the axilla, and not above the clavicle.

Case 76.—*Pure subclavian aneurism ; ligature of artery, requiring partial division of the scalenus muscle ; recovery.*

Female, æt. 21. A pulsating tumour in the neck made its appearance immediately after she had subjected the *left* arm to severe and unusual exertion in saving herself from a fall. The tumour was of the size of a hen's egg in the left subclavian region or posterior inferior triangle of the neck; it was so near to the edge of the scalenus that the artery was not able to be compressed between the tumour and the muscle. Ligature of the artery was performed close to the outer border of the scalenus, and it was necessary to divide a few fibres of the muscle to tie the vessel more readily. No bad symptoms or inconvenience followed the operation. Pulse returned in the radial artery on the fourteenth day,

Tabular view of the nine cases of Recovery after Ligature of the third portion of the Subclavian Artery.

No. of cases.	Sex.	Side.	Cause.	Size.	Duration.	Previous preparation.	Operation.	After consequences.	Ligature came away.	Result.
76	F.	L.	Musc. exer. and fall	Hen's egg	Short time	Ice; vene-section	Partial division of scalenus	Not a bad symptom or inconvenience	20th day	Seen six months after quite well.
77	M.	R.	Musc. exer.; heavy hammering	Small size	Not stated	—	Nerve included in ligature, but released	No bad symptom	Not stated	Seen some years after quite well
79	F.	L.	Musc. exer.; drawing corks	Ft. geon's egg	4 mths.	None	Deviation of artery peculiar	Rapidity of collateral circulation remarkable	96th day	About one year after had fever and died.
72	M.	L.	Spontaneous	egg Half hen's egg	3 mths.	None	No difficulty	Attack of ch. phlebitis in veins of left leg and thigh and basilic vein	47th day	Seen at end of seven years quite well
80	M	R.	Fall on barrel	egg Oval	4 mths.	None	Great difficulty; wound of vessels; division of scale-nus	Communication of aneurism with lung; hæmorrhage from seat of lig. on 15th day	21st day	Good use of arm.
82	M.	L.	Carrying weights with rope	Hen's egg	4½ mths.	Valsalva method	Difficulty; deep artery; clavicle pushed up	Nothing particular	13th day	Good recovery.
86	M.	L.	Spontaneous	Lg.	6 wks.	Treated for rheumatism of shoulders by blisters, bleeding, &c. Valsalva method	No difficulty	Febrile symptoms; V.S.; digitalis; erysipelas; sub-cut. suppuration	16th day	Inability to bend fingers.
87	M.	L.	Spontaneous	Half hen's egg	Not aware of existence	Valsalva method	No difficulty	No bad symptoms until 4th week; suppurating sac, laid open	17th day	Five weeks after fell on shoulder and had temporary paralysis; regained entire use of arm
88	M.	R.	Spontaneous	Hen's egg	4 mths.	Valsalva method	No difficulty	No bad symptoms	23rd day	Recovered entire use of arm, but unable to bend fingers.

Subclavian.   Subclavio-axillary.

and the ligature came away on the twenty-first day. Seen six months after in perfect good health.

Nicholls observes that this case proves that the very short distance between the ligature and the thyroid axis affords sufficient space for the formation of a coagulum and the subsequent obliteration of the arterial tube.

CASE 79. *Warren.—Pure subclavian aneurism; unusual course of artery from deformity; oblique incision and ligature of vessel; recovery.*

Female, æt. 30. Was the subject of an acquired deviation of the left subclavian artery in consequence of a curvature of the spine; this artery became the seat of an aneurismal tumour about the size of a pigeon's egg, just above the scapular end of the clavicle, and it was of four months' duration; it was attributed to the drawing of a cork from a bottle; when straining, she felt a sudden crack at the point where the tumour subsequently formed. Pressure could not be borne on the vessel above the tumour in consequence of the pain and numbness. Ligature of the artery performed by an oblique incision from the outer edge of the sterno-mastoid muscle towards the acromio-clavicular articulation, the pulsation of the artery being the guide. The patient's arm and hand were a little cold after the operation, but soon regained the natural temperature. The rapidity with which the collateral circulation was restored was remarkable, the radial pulse being felt twenty-four hours after the operation. The ligature on the artery did not separate until ninety-six days after the operation. A perfect recovery resulted. About nine months afterwards the site of the tumour was carefully examined, and there was still evidence that it had not entirely disappeared, and it conveyed the impression to the touch of containing a fluid. On its surface and incorporated with it was a very large arterial trunk, supposed to be the supra-scapular; this vessel pulsated powerfully and at first gave the appearance of pulsation to the tumour, but by careful manipulation it could be lifted off it. This patient died of typhoid fever about one year after the operation. It was impossible to make a very careful examination of the parts. On the neck was seen a scar where the incision had been made. No tumour or other marks were observed at the point formerly occupied by the aneurismal sac.

The skin and cellular membrane and fascia being removed, the vessels and nerves were at once exposed, on account of the absence of adipose tissue. The subclavian artery, from its origin to the anterior edge of the scalenus anticus, maintained its original size, but here it suddenly terminated. From this spot to the aneurismal sac was extended a flat cord an inch and half in length, seeming to be composed of little more than condensed cellular membrane. The aneurismal sac had contracted to a bulbous form, and was about twice the size of the vessel in its normal state, the enlargement suddenly ceasing at the point where the artery is embraced by the two heads of the median nerve, and the vessel there regaining its natural size. On its surface was the supra-scapular artery, in this case a branch

of the transverse cervical, greatly enlarged, and which gave rise to the apparent pulsation in the tumour before death.

The vessels forming the thyroid axis were twice their natural dimensions. The internal mammary was enlarged and given off from the thyroid; it was through the inosculation of this with the thoracic, and through that of the posterior scapular with the subscapular, that the collateral circulation had apparently been accomplished.

The four other cases (72, 82, 86, and 87), in which the left artery was the seat of aneurism, occurred in males, of middle age, between 30 and 47; in three the origin was considered spontaneous, and in the fourth the disease was attributed to the carrying of heavy barrels suspended by a rope over the shoulders and across the neck, but much stress has been laid upon the fact of the patient having previously been the subject of syphilis, which by some pathologists is considered to be a predisposing cause to arterial disease.

CASE 72. *Skey.—Supervention of chronic phlebitis of veins of left lower and upper extremities after ligature; perfect recovery.*

Rev. Mr. P—, in January, 1841, complained of numbness in *left* hand and arm, which had existed for two months. He had observed the arm also to be more susceptible of cold, and that it required the application of artificial warmth to enable him to use it while dressing. The hand was pale, more especially that part which is supplied by the median nerve, the little finger and outer half of the ring finger being affected in a less degree. No pulsation was felt in the radial artery. The brachial artery, especially at the lower part, beat languidly, and pain was felt in pressing the finger along the track of the vessels. Above the clavicle, just half way between the two extremities of the bone, there was a small tumour pulsating synchronously with the heart, about the size of half a hen's egg. Its contents were partly fluid and partly solid. Pressure on the tumour reduced it greatly in size, and stopped the circulation in the brachial. The line of the trunk of the vessel above the tumour could be traced to the extent of three quarters of an inch upwards to the scalenus muscle.

In four days the tumour increased in size one third, and the numbness of arm in proportion, and it had encroached on the trunk of the artery above.

The peculiar position of the aneurism, involving the portion of the vessel which lies on the first rib, and yet more subclavian than axillary, and the positive advance of all symptoms during the short period of four days, determined Mr. Skey to perform the operation immediately.

Ligature of subclavian artery external to scalenus was performed without any difficulty. Two hours after the operation sense of pain in the region of the sac, shooting towards the heart; difficulty of swallowing; temperature of limb somewhat increased. These subsided, but on following night had again difficulty of swallowing and dyspnœa. On third day continuous cough with difficult breathing

and anxious countenance, and great sense of weakness. He had a severe attack of general rheumatism. The wound (healed on the eighth day. These symptoms were followed by a painful attack of chronic phlebitis of the left leg and thigh, and the foot became large from œdema. This under treatment subsided.

The disease affected the saphena major and minor veins, as also the femoral and even the external iliac. An excoriated surface was produced over the track of the vessels by hot water, and afterwards rubbing over with Unguent. Hydrarg. c. Opio, and rolling the thigh in flannel.

On the thirty-second day he had a similar attack in the basilic vein. on the left side, which was also combated by Unguent. Hydrarg. c. Opio.

In the mean time the sac became greatly reduced in size, and the hand had regained its sensibility and temperature. Ligature removed on the forty-seventh day. The pulsation in the radial artery returned on the fifty-first day. Patient seen nine years after; he had no return of the disease, and was in possession of good health.

CASE 86. *Wishart.*—*Treated for rheumatism by blisters and venesection; had œdematous swelling of the side of the body as far as the pelvis; subsequent ligature of vessel, followed by much suppuration in tissues surrounding wound; recovery.*

John R—, æt. 47, a porter, admitted into the Royal Infirmary, Edinburgh, on August 7th, 1823. He complained of considerable pain of the left elbow-joint, particularly on motion. There was no perceptible swelling or discoloration of the soft parts, but he was able to make very little use of his arm, and he complained of great weakness of it. The motions of the forearm made freely and without pain; general health good. Reports that about six weeks ago he was attacked with pain in the elbow-joint, which has since increased, though bleeding, blisters, &c., have been freely employed at the Leith Dispensary.

From his admission to August 20th the patient referred all his complaints to the elbow-joint and the fleshy part of the biceps muscle. At this time the forearm became painful and œdematous, and a roller was applied from the fingers upwards, and there was a good deal of œdematous swelling of the side, extending nearly as low down as the spine of the ilium. On examining his chest there was perceived a considerable swelling under the pectoral muscle, extending along the lower margin of the clavicle to the axilla. On pressing on this tumour a distinct pulsation was found in it, and a peculiar thrilling sensation, more especially at the sternal extremity of the tumour. The pulse at the wrist was much feebler than that of the other arm.

On questioning the patient he stated that about three weeks before admission he had noticed a small knot like a bean under the edge of the clavicle, but he could not point out the precise spot; he paid no attention to it, as it gave him no uneasiness, and he never mentioned it to any of the surgeons.

On August 22nd no pulsation could be felt in the tumour, but towards the sternum the peculiar thrilling sensation was still perceived, but not so distinctly.

No pulsation could be felt at the wrist nor in the course of the humeral artery. The pulse in the other arm was natural; the pulsation of the left subclavian artery was felt distinctly above the clavicle. The œdema had decreased, and the tumour was more prominent, but the pulsation in it distinct.

August 23rd ligature of the subclavian artery close to the outer margin of the scalenus muscle. After the operation the arm felt a little benumbed and cold, but regained its warmth. Pulse in evening 100, natural.

Second day.—Passed a good night; size of tumour diminished; œdema of hand and forearm reduced. The left arm felt warmer than the right, but by the thermometer the heat in both axillæ was the same. Pulse 108, moderate.

Everything went on favorably for some days; the discharge was moderate and healthy.

On seventh day slight pulsation was felt in the brachial artery.

On tenth day he was affected with nausea, loss of appetite, heat of skin, flushing of face. Pulse 108, full and hard. Venesection ad ℥xvj. Purgatives.

On eleventh day much relieved in every respect; the pulse became fuller in evening. Venesection ad ℥xij.

On twelfth day slight pain in tumour; passed a good night. Was bled again in the evening to 10 ounces.

He continued to improve, although there was some erysipelatous redness about the wound, extending down the side. Pulse not yet perceptible at the wrist. He had been taking tincture of digitalis in small doses, with saline mixture every two hours.

On the sixteenth day the ligature on the artery came away, and on the following day the pulse was distinctly perceptible in the wrist. The erysipelatous affection of the side was fading, but there was a tendency to suppuration, and an abscess burst on the night of the twenty-first day under the axilla, and discharged a quantity of matter of a grumous appearance; the opening was afterwards enlarged, and another one made lower down in the side.

The aneurismal tumour was now gone, and the left clavicle as prominent as the right.

He slowly regained his strength, and on October 24th he was able to walk about. The arm was very much reduced, but he had perfect feeling in it. He was still unable to bend his fingers and the pulse at the wrist was feeble.

CASE 82.   *Sawinkoff.—Ligature successful after failure of the Valsalva treatment.*

John N—, a cooper, æt. 30, of healthy complexion, was admitted on 8th November, 1822, into the Marine Hospital, St. Petersburg. He had under the left clavicle a pulsating tumour, which was caused by the pressure of a weight, which he carried some distance on the 24th of June, 1822. A rope, which connected five barrels hanging over the back with four in front of the chest, lay upon the left shoulder and caused him so severe a pain that he fainted. On recovering he felt much weakened by the heavy weight, and returned back home to his ordinary work. Three months afterwards he felt pain under the left clavicle, which he in vain

sought to relieve by ordinary means. At the painful spot he found a pulsation, which daily increased, and in a short time formed an external tumour; after its appearance he felt an extraordinary weakness of the left arm, with numbness of the fingers. As he was now not able to work he applied to the hospital. I found a tumour, round, pulsating, and expanded, of size of a hen's egg, under the scapular end of the clavicle, lying to the inner side of the head of the humerus under the pectoralis minor. The pulsation could not only be felt but seen. On pressure of subclavian artery against first rib pulsation in tumour ceased, as also in radial pulse; on direct compression of the tumour it diminished, but the patient could not bear this long. In the artery as it passed over first rib from outside the scalenus an aneurismal thrill was felt, as also a trembling movement of the walls of the vessel; the same condition found in the aneurism itself. All the blood-vessels on the left side of the neck were full of blood. In the arteries of the neck the pulsation was so strong that it could be observed by the sight. The pulse in the left hand was weaker than the right, although the rhythm of both were natural. It was considered to be an aneurism of the axillary artery, following severe strain and mechanical pressure. No appearance of any organic disease. The patient had seldom been ill; he had had a simple venereal sore, but had had iritis, whereby the left eye was rendered somewhat dull.

I proposed tying the third portion of the subclavian, but by the advice of my colleagues I put him under the Valsalva treatment. He was ordered two pounds of meat broth. Venesection several times (every four or five days) and purgatives.

For the first fourteen days no impression on the tumour. Digitalis now given, and after three weeks since admission no benefit; put him on sulphuric acid, but in the course of a month the *swelling rose above the clavicle* and had reached the size of a goose's egg, pulsated very strongly and caused most acute pain, reaching down to whole arm and chest. Integuments, &c., over tumour unchanged, but veins enlarged. He had a troublesome cough, and complained of noises in the ear, headache, and tightness of neck, chest, and back. Loss of appetite, sleep and febrile disturbance. Under all these circumstances—

On January 5th, 1822, ligature of subclavian external to the scalenus was performed. Much difficulty in the operation, as the clavicle was pushed upwards and forwards. He had severe pain in the arm and great restlessness after the operation, but these symptoms soon subsided. Ligature came away on thirteenth day; recovery.

CASE 87. *Porter, W. H.—After ligature, suppuration of sac at fourth week; recovery.*

Wm. Austin, æt. 40, an ostler or helper about livery stables. Admitted into the Meath Hospital on June 25th, 1829. He complained of pain in the left shoulder and arm and hand, together with a distressing sense of numbness, contraction of the fingers, and œdema of the lower portion of the limb. The pain in the arm and hand was so excessive as entirely to prevent him following his usual employment, and occasionally to deprive him of sleep. He had a firm pulsating tumour below

the clavicle, in that part corresponding to the division between the pectoralis major and deltoid muscles, about the size of the half of a hen's egg, becoming smaller on being pressed, and losing the pulsation and almost disappearing when the artery was compressed above the clavicle.

He had no recollection of having ever sustained any injury in that part, neither had the tumour been observed by him until eight or nine days since. Even on his examination he could not be persuaded that the tumour, in which he felt no pain, could be the cause of or connected with the uneasiness and numbness of the arm.

On admission he was confined to his bed, and kept perfectly quiet; cold applied to the tumour; saline purgatives every day, and venesection on the 27th to extent of ʒxiv.

Notwithstanding this treatment the tumour increased with great rapidity, extending outwards towards the axilla, and slightly displacing the clavicle upwards.

On the 29th the tumour had increased to more than double its original size, and, as its further growth might be pushing the clavicle upwards, it was determined not to put off operative measures any longer.

On June 30th the subclavian aneurism was ligatured close to the outer border of the scalenus muscle. The pulsation in the aneurism and in the radial artery ceased instantaneously. No perceptible alteration of temperature at any time in the arm.

On the second day the veins on the back part of the hand were large; the radial artery evidently full of blood, and feeling like a soft cord under the finger.

On the tenth day a slight thrill was perceived in the vessel—some thought pulsation.

On the seventeenth day the ligature came away. Suppuration small in quantity and healthy. The aneurismal tumour was greatly diminished in size, and its edges scarcely defined.

He had no constitutional disturbance, and made a constantly progressive improvement.

On the twenty-first day the wound might be considered as healed; arm free from pain; its sensibility and freedom of motion restored; œdema of hand and fingers removed. The tumour diminished; somewhat tender, owing probably to the daily handling of the part by pupils and others; consequently he was removed from hospital to comfortable lodgings.

However, the tumour increased in size, became tense and painful, but not discoloured. Twelve, fourteen, or twenty leeches were daily applied for five or six days; cold lotions; saline purgatives; low diet; yet the tumour still continued to grow, and seemed to have a tendency to point towards the axilla. He was, therefore, readmitted into the hospital on August 12th.

On the 14th August the abscess was opened by a free incision, and about one pint of fœtid, purulent matter, mixed up with large clots of dark coloured blood, discharged, and with great relief. After emptying it slowly and carefully, a large compress was applied and firmly secured by a few turns of roller round the breast and shoulder. From this time he quickly improved, and left the hospital perfectly well on August 31st.

At the latter end of October the patient was actively engaged in his former occupation as assistant in a stable, and stated that he was as well able to earn a subsistence as at any former period of his life.

It may be proper to mention that this patient received a fall upon the shoulder soon after, which affected the arm with paralysis for some weeks. He has, however, since recovered, and is at this moment (1830) employed as a helper in a stable, but certainly he is not quite equal to severe or continued exertion.

Porter draws attention to the very trifling disturbance of constitution that followed the operation, this patient never having a single symptom that could occasion anxiety as to the result until the occurrence of inflammation and suppuration of the sac, and recovery occurred notwithstanding this event.

The three cases of recovery after ligature of the third portion on the right side occurred in males (Cases 77, 80, 88); the ages of the patients were 35, 38, and 60.

CASE 77. *Green.*—A workman, æt. 35, had a subclavian aneurism of small size, which he attributed to heavy hammering. In this case one of the nerves of the brachial plexus was included in the ligature. The agony produced was extreme; the man did not cry out, but the expression of his face was something most appalling. Mr. Solly, who was present at the operation, stated that the condition of the patient reminded him of a celebrated picture of the dying agony of one of the cardinals—the expression of the face and the stretched-out clenched hands, &c. The ligature was immediately loosed and the artery alone deligated, and all the frightful symptoms disappeared. The man made a good recovery, and was seen many years afterwards perfectly well.

CASE 80. *Bullen.—Case remarkable for the aneurism bursting into the lung as well as externally after ligature, and yet perfect recovery resulting.*

Thomas M—, æt. 60, a sailor, admitted into the Lynn Dispensary on March 21st, 1823, having a soft pulsating tumour, of an oval and conical form, situated on the right side and extending obliquely from the sternal end of the third rib to a little above and within a quarter of an inch of the humeral end of the clavicle. It could be partly emptied of its contents by pressure. The right arm and hand were frequently benumbed, and at times very painful and slightly swollen; pulsation of the brachial and radial arteries was so feeble as scarcely to be felt.

He stated that some four months ago a tar barrel fell upon the shoulder, but it occasioned him at the time only temporary inconvenience. On April 3rd ligature of the third portion of the subclavian was performed; the external jugular vein

was divided and tied, and the operation itself was very difficult and tedious, and the following subsequent steps of the proceedings are thus described :—A pulsation being distinctly felt at the bottom of the wound, by cautious procedure, partly with the handle of the knife and the finger nail, an artery, supposed to be the subclavian, was exposed and detached, and a needle armed with a ligature passed underneath it without difficulty. In doing this it was observed that the coats appeared thin, somewhat resembling a vein ; here we ascertained by pressure on the vessel that it did not command the pulsation of the tumour, and thence concluded it was not the subclavian. The outer fibres of the scalenus muscle were divided to give more room. The vessel was then turned aside by means of the ligature, and the proper trunk discovered and the aneurism needle passed round it ; the ligature on the needle around this artery was then laid hold of with a pair of forceps, and on withdrawing the needle a large stream of florid blood gushed forth, per saltum, from the wound. An assistant plunged his finger into the wound and pressed on the artery, and while he thus suppressed the bleeding the ligature, which was supposed to be upon the subclavian, was tied. The finger being cautiously withdrawn, it was a source of the highest gratification to discover that no hæmorrhage followed. The pulsation, however, of the artery as it passed between the clavicle and first rib was not stopped, nor was it in the aneurismal tumour. On attempting to remove the first ligature it was found fast, and by sponging away the blood from the bottom of the wound it became evident that this had been, in the hurry and agitation of the appalling moment, tied in place of that on the subclavian, and that the knot had included one of the ends of the latter ligature. As it was difficult to distinguish the included end from those belonging to the ligature that had been tied, all the three ends were made fast in succession to the one which remained detached on the other side of the artery. The pulsation then ceased and never afterwards returned.

It was now evident that in pressing up the end of the needle to clear the point of it, the coats of an anastomosing vessel, lying anterior to the subclavian, had been penetrated, and under which the first ligature was passed.

It was remarkable that the pulse in the wrist of the same side, and which directly after the artery was tied could not be felt, was in the evening as distinct and as large as that in the other arm. The arm for several days after the operation was generally found in a state of perspiration. The heat was never lessened.

Low diet ; quiet. On second day, in evening, irregular intermittent pulse. Venesection to 12 oz., repeated on following evening. After eighth day pulse regular, tumour lessened, and wound healing. On sixteenth day after operation hæmorrhage from the wound, which had nearly healed, except where the ligatures hung out. Lost three to four ounces ; dressings removed, but hæmorrhage had stopped. Ligature on main artery remained firmly attached. Thinking that the hæmorrhage came from one end of the jugular vein, which had been divided and tied, compress applied along that vessel. In the morning, on gently pulling the ligature on the subclavian, a slight oozing of blood, clearly arterial, came along it. A thick compress was applied. In the evening hæmorrhage ; he was almost covered with blood, and fainted ; compress removed, as hæmorrhage had ceased. Compresses again used. Recurrent hæmorrhage at 1 a.m. and 6 a.m., but not much ; it stopped of itself.

On nineteenth day fœtor from wound; compresses removed. No hæmorrhage. Healthy pus.

On twenty-first day the ligature, which had for several days been twisted by means of a piece of wood put through its end, and fastened down by plaster, was found lying loose in the wound. On examining the ligature it was found that the knot upon the subclavian artery had given way, on account of its not having been tied double.

The aneurismal tumour on the eighteenth day began gradually to increase in size, without pulsation, and on the twenty-sixth day this became so evident that it was proposed to puncture it next morning. In the evening, however, a violent cough came on, which continued incessant through the night; and on visiting him in the morning it was found that he had brought up, by coughing, six or eight ounces of bloody pus, very high coloured, and that the tumour had diminished during the night about one half; but as it evidently yet contained a considerable quantity of fluid, and as he was exhausted by incessantly coughing, it was determined to evacuate its contents by a small opening at the most dependent part. About five ounces of the same kind of matter escaped, and with great relief.

A cavity could now be distinctly felt between the first and second ribs at their sternal ends, through which the fluid had passed into the lung; and as there was now a free communication with the lung, the air passed freely into the sac whenever he coughed, distended it, and sometimes the air escaped by the external opening. Compress fixed over opening of communication between lung and sac, and a plug of lint put into the outer opening, and occasionally withdrawn to let out the matter. The discharge from the outer opening and through the lung gradually lessened, and at the end of three weeks nothing was discharged from the outer opening, and therefore it was allowed to close.

After escaping from this dangerous situation he had erysipelatous inflammation on left side, and partial suppuration formed in different parts.

About seventy-five days after the operation there were two small openings discharging a bloody pus, one inch above the other, and communicating by a sinus. This was laid open, and lint inserted. In the evening, while stooping to pull off his stockings, a large stream of blood suddenly gushed from the wound, and was with difficulty checked by pressure of the hand; it soon stopped, and he fainted. Compresses. No return of hæmorrhage. On fourth day skin over seat of aneurismal tumour inflamed, tumid, and tense, but this soon subsided and disappeared. Wound healed, and in ninety-two days he was quite well. His health became fully re-established, and could use both arms freely. The hand, however, was sometimes slightly benumbed.

CASE 88. *Hobart.—Previous to operation Valsalva treatment adopted without any ill effect.*

Mr. John W—, æt. 38, a respectable inhabitant of this town, of good bodily habit, consulted me for a tumour situate immediately under the right clavicle near to its acromial end, and extending towards the axilla, from which he suffered considerable inconvenience in the movements of the arm, compelling him to use the left when requiring any exertion. He complained of acute pain in the corresponding

scapula. On examination I perceived a pulsating tumour, somewhat larger than a hen's egg, occupying the space mentioned, and of an aneurismal character.

Upon inquiring into his history he stated that about four months previously while in the enjoyment of his usual health, and uninfluenced by any bodily exertion, he "suddenly felt an unusual sensation, as if his heart had leaped from its proper position to that now occupied by the tumour." This, however, went off in a little time, and he paid no attention to it afterwards, until the appearance of the tumour and its increasing inconvenience had somewhat alarmed him.

The ligature of the artery was proposed and acceded to, but before operating he was purged freely and largely bled, and had cold applications for several days; notwithstanding this treatment the tumour was perceptibly increased, and on the 5th of May it had acquired the size of a large duck's egg.

On May 7th ligature of the subclavian artery close to the scalenus muscle. Flannel roller from hand upwards. The tumour became flattened, all pulsation stopped, and the radial ceased to beat.

On the second day he was tranquil; temperature of limb not perceptibly lessened; heat in either axilla 98°; pulse 100, strong and full; no constitutional disturbance.

3rd day.—Slept well; pulse 100; heat of limb 98°; salines every third hour.

4th day.—No bad symptoms; appetite, general health and spirits good.

Went on well without any drawback. Pulsation in the right radial indistinctly felt on 12th day. The ligature came away on the 23rd day.

On July 30th.—Has been since employed as usual in business. All the movements of the arm are performed without the slightest inconvenience. He enjoys his accustomed health. The tumour gradually declined, and at present there is scarcely any trace of it remaining (August 1st, 1835).

General summary of the nine recoveries after ligature of the third or second portion of the subclavian artery for subclavian or subclavio-axillary aneurism.

1. *Sex.*—Two females, and seven males.

2. *Ages.*—Comparatively young, viz. 21, 30, 30, 35, 38, 40, 47, 60, and one stated to be of middle age.

3. *Situation and cause.*—It is remarkable that six out of the nine recoveries occurred after ligature of the left artery. Three were true subclavian aneurisms, and attributed to muscular exertion, two being on the left and one on the right side.

Six were subclavio-axillary aneurisms. Of these, two were attributed to injury, one on the right side to a fall, and one on the left to carrying weights suspended by a cord over the shoulder; the other four cases were purely spontaneous in their origin, three being on the left side and one on the right, and may be fairly set down to some presumed diseased condition of the vessel. These cases are Nos. 72, 86, 87, and 88. It is singular

that in three of these cases there occurred after the operation serious consecutive effects in the shape of chronic phlebitis, suppurating sac, &c.

4. *The duration of the disease* previous to operation was comparatively short, being under four and a half months, as far as the reports can be relied upon. Case 87, not aware of it; Case 76, short time; Case 86, six weeks; Case 72, two months; Cases 79, 80, 82, 88, about four months; Case 77, not stated.

5. *The size of the aneurism* in no case exceeded that of a hen's egg. Small size, Case 77; pigeon's egg, Case 79; half hen's egg, Case 72; hen's egg, Cases 76, 82, 87, 88; large, Case 86; oval, Case 80.

6. *The previous treatment.*—In four a moderate Valsalva treatment was put in practice, Cases 76, 82, 87, and 88; and in one, Case 86, the patient was treated for rheumatism by venesection, blistering, &c.

7. *The operation itself.*—*In four cases* there was *no difficulty whatever,* three being on the left and one on the right side (Cases 72, 86, 87, 88); yet one of these had chronic phlebitis, another had erysipelas and subcutaneous suppuration, and a third had suppuration of the aneurismal sac.

In two cases, 76 and 80, one on the right side and the other on the left, there was required *partial division of the scalenus anticus* muscle to give more room for deligation, for there was much trouble in securing the artery, and in neither case was there any injury done to the phrenic nerve.

In one case a trunk of the *brachial plexus was included* in the ligature instead of the artery, but this was immediately rectified, and without any ill effects ensuing. It occurred on the right side.

In one there was a *deviation in the course of the left* artery, which necessitated a vertical or rather an oblique incision.

In one case, on the left side, there was *considerable difficulty* in the operation, owing to the clavicle being pushed up, thus rendering the artery exceedingly deep.

8. *The after consequences.*—In five cases, 76, 77, 79, 82, 88, *no bad symptom* whatever. Two were on the right side, and three on the left; two females, and three males.

In one there supervened *chronic phlebitis,* which subsided.

In one there were *febrile symptoms, erysipelas,* and *suppuration* of the cellular tissue around the seat of the wound.

In one at the end of the fourth month there occurred *suppuration of the sac,* which had to be laid open ; this accident was due chiefly to the inordinate manipulation of the sac after its cure by over-interested observers.

In one case the *aneurism communicated through the chest into the lung ;* the sac suppurated and was opened externally, so that there was a passage through the aneurism from the lung to the external surface, air passing in and out through the sac readily. This case, however, made a good recovery, although he had secondary hæmorrhage on 16th day from the seat of ligature, which was controlled.

9. *The ligature came away* on the left side on the 15th, 16th, 17th, 20th, 47th, and 96th days; on the right side, on the 21st and 25th day ; in one the day not stated.

10. *Permanent results.*—In nearly all there was a *good and permanent recovery* as far as regards the aneurism.

In two there remained an *inability to flex the fingers,* and this occurred respectively on the right and left sides.

One case *died of fever* a twelvemonth after, and the examination proved the perfect cure of the aneurism.

One case was seen seven years afterwards, and in perfect health.

One other point only remains for consideration in respect to the success of the above nine cases, viz., Was the aneurism developed in a healthy artery ? For if so, it will readily explain the success of ligature in all these cases. The cases themselves prove that ligature of the third portion, as well as that of the second portion, may be effected with perfect safety, and that there is no fear of want of formation of clot on either side of the ligature, in consequence of proximity to the sac or to the branches given off from the artery. These points will be more especially and more appropriately discussed when considering the deaths due to failure of ligature of the vessel.

For the present we will merely remark that, in reviewing the *causes* of these nine cases, as detailed at page 117, 'Guy's Hospital Reports,' 1869-70, we may fairly presume that in three of these the aneurism was entirely of a local character, independent of general arterial disease, viz. cases 76, 77, 79. These were true subclavian

aneurisms ; the ligature was applied very near to the sac, and they recovered without a bad symptom. These appear to be genuine cases of aneurism arising from laceration of the inner coats of a healthy artery, and gave no evidence of atherosis or atheromatous condition of the vessel. We cannot say so much for Case 82, for although he was a young man only thirty years of age, yet he had had syphilis in a mild form in early life, a condition considered by some to lay the foundation for arterial disease; still, he must have had good reparative powers, for he was subjected to the Valsalva treatment previous to the operation, and had febrile symptoms after the ligature was applied, with much constitutional disturbance, and yet he made a good recovery, the ligature coming away on the thirteenth day.

In Case 80, a man æt. 60, there must have been a considerable healthy arterial system to repair the effects of the operation, the secondary hæmorrhage from the seat of ligature, and the subsequent occurrences, which have been fully detailed in the report of the case.

In each of the remaining four cases the patient referred his aneurism to spontaneous origin, having accidentally discovered the tumour without any previous knowledge of its existence, otherwise than rheumatic pains about the shoulder, neck, or down the arm. Now, in these cases, was there disease of the arterial system ?—was the subclavian aneurism a mere local manifestation of a general atherosis ? Of course we have no means of proving this either one way or the other, for all recovered, and as far as the operation was concerned the artery, where ligated, was in all the cases found healthy. We can only say this, that subclavian aneurism in its early stage, occurring in persons of the early or middle period of life, without any indication of disease of the heart or large vessels, may and does recover, and that a cure may be effected by means of ligature of the third or second portion of the artery, notwithstanding the disease is one of spontaneous origin, and therefore presumed to be indicative of arterial disease.

We now come to the consideration of the twelve deaths after ligature of the third or second portion of the subclavian artery for subclavian aneurism ; these are numbered Cases 68, 69, 70, 71, 73, 74, 75, 78, 81, 83, 84, and 85. These are all

lar view of the twelve cases of Death after Ligature of the third and

Sex.	Age.	Side.	Cause.	Size.	Duration.	Previous Treatment.	Operation.
M.	48	R.	Fall	Goose egg	6 months	Valsalva	Dividing and tying external jugular vein; no difficulty
M.	73	R.	Spontaneous	Swan's egg	3 months	—	Puncture of sac
M.	50	R.	Spontaneous	Lemon	2 months	—	Indurated and adherent tissues; artery dilated
M.	65	L.	Spontaneous	Pyriform	18 months	—	Indurated and adherent tissues; partial division of scalenus
M.	50	L.	Muscular exertion	Turkey's egg	6 weeks	—	Much struggling; no difficulty
M.	59	R.	Spontaneous	Orange	2 years	—	Division and tying of external jugular vein; no difficulty
M.	54	R.	Spontaneous	Orange	4 months	—	Nothing particular
M.	43	R.	? Fall	Foot-ball	9 months	—	Difficulty in operation
M.	61	R.	Muscular exertion	Goose egg	6 months	Valsalva	Adhesions; artery enormously dilated; great difficulty
M.	40	R.	Spontaneous	Large	3 months	—	Nothing particular
M.	44	L.	Spontaneous	Half hen's egg	—	Valsalva	Difficulty

second portions of the Subclavian Artery for Subclavio-axillary Aneurism.

After consequences.	Condition of ligature.	Cause of death, and date.	Condition of sac.	Condition of contents, &c., of artery.	
				Proximal end.	Distal end.
Diffused cellular inflammation; suppuration; gangrene of limb	Fixed	Prostration and coma; lived 110 hours	Not stated	Two small clots	Close on aneurism, and small.
Fearful hæmorrhage; pleurisy; V.S.	Fixed	Loss of blood; coma; 4th day	Empty	Not stated	Not stated.
Febrile symptoms; pyæmia; V.S.; suppuration of wound	Fixed	Pyæmia and exhaustion; 7th day	Fibrinous coagula	Dilated, and held fibrinous clot	Dilated, and contained recent coagulum.
Febrile symptoms; V.S.; drowsiness	Fixed	Apoplectic serous effusion on brain; 3rd day	Not stated	Thickened and enlarged, and contained adherent coagulum	Adherent coagulum.
Pleurisy and pneumonia; V.S.; empyema	Loose in wound	Exhaustion, &c.; 15th day	Not stated; opening of artery into sac small	Patulous, and scarcely plugged	Not stated
Febrile symptoms checked; hæmorrhage on 9th day; recurrent	Fixed, and ulceration of artery at seat	Hæmorrhage on 12th day	Large clot; fœtid, grumous	Large sloughing opening, containing small, unhealthy clot	Sloughy state, fetid fluid, and grumous blood in interior.
Pyæmic symptoms on the 13th day; suppurating sac; abscesses; hæmorrhage on 46th day; recurrent on 52nd and 64th days	Came away on 20th day	Hæmorrhage, on 65th day	Suppurating sac	Pale fibrinous clot	Firm clot and occlusion
Febrile symptoms; hæmorrhage on 13th day	Two ligatures, one fixed, the other loose in wound	Hæmorrhage, on 14th day	Hæmorrhage came from the punctured sac	No trace of reparation	No trace of reparation.
Hæmorrhage	—	Hæmorrhage	—	—	—
Suppuration; hæmorrhage on 28th day	Ligature probably came away	Hæmorrhage; 29th day	Black, soft, grumous clot	End lying in a large pyæmic cavity; no clot; patulous	End lying in a large pyæmic cavity; no clot; patulous
Hæmorrhage on 8th day	Fixed, and suddenly stretched	Hæmorrhage; 9th day	Firm coagula in opening of artery into sac; black semi-fluid blood in sac	Firm coagulum strongly adherent to coats	Internal mammary artery opened close to ligature, and probable source of hæmorrhage.
Pneumonia; hæmorrhage on 26th day; recurrent attacks	Ligature came away on 20th day	Hæmorrhage, on 35th day	Sac filled with fibrine	No clot or blocking up	Roundish ulcerated opening, two lines from ligature.

cases of subclavio-axillary aneurism, there not being one of purely subclavian disease. They are all males, and their ages are from forty-three and upwards. In eight the disease was on the right side, in three on the left, and in one it is not stated. We shall, as has been done with the recoveries, give first of all a tabular view of the twelve cases (see pp. 90 and 91, antè), then add a short abstract of each case, and afterwards make such deductions as may be possible with a view of ascertaining the cause of death and failure of the operation.

CASE 68. *Colles.—Operation followed by diffused cellular inflammation and gangrene of limb and cerebral symptoms ; death on fifth day.*

On the 19th of June, 1815, I was consulted by the Rev. Mr. S—, æt. 48. He was a man of an uncommonly athletic frame ; had constantly enjoyed the most robust health, and had always lived a regular and temperate life. The account he gave of his complaint was as follows :—One night before Christmas last, while lying in bed, his right arm was suddenly seized with a numbness, and the right hand felt as if instantaneously enlarged to twice its natural size. He recollected afterwards that, a few days before, his horse had fallen and rolled over him, and that he suffered considerable pain about the shoulder at the time of the fall. Soon after this the middle of the forearm and the insertion of the deltoid were attacked with pains. He said that the physician in the country had remarked with some surprise that he could not feel any pulse at the wrist of the affected arm. The disease passed for rheumatism until he came up to Dublin, when on being electrified the portion of the chain which happened to lie on Mr. S—'s breast was observed to be moved up and down by a violent pulsation of some subjacent part, and on examination an aneurismal tumour was discovered below the clavicle, covered by the pectoral muscle.

The aneurism was nearly of the size of a goose's egg, it pulsated strongly, but seemed notwithstanding to be both deeply seated and thickly covered. The pulse of the right radial artery was as full and as strong as the left. By pressing the thumb upon the *diseased* artery above the clavicle, at the outer border of the scalenus muscle, the pulsation in the tumour and at the wrist was suppressed. But a strong pressure on the tumour itself, even when continued for some time, excited no uneasy sensation whatever, either in the region of the heart or in any other part of the thorax, nor did it affect respiration in the least. Nothing abnormal could be discovered in the heart's action or in the arteries.

The operation of tying the subclavian was advised. The patient went into the country to arrange his affairs, and was advised to avoid all bodily exertion and to live on very low diet. He was prescribed some strong purging pills and to be blooded twice at least before his return.

On July 16th he returned, a good deal reduced in flesh and colour. The aneurism had increased in size, principally in the direction towards the clavicle. Indeed,

to judge by the eye only, the tumour seemed to have extended to that bone, but by the touch it could be ascertained that the tumour and the clavicle were not yet in contact.

The operation of tying the subclavian close to the external border of the scalenus was performed. External jugular vein divided and tied, as also other veins. Pulsation in tumour and in the artery of the limb ceased.

Shortly after the operation he complained of cold, but had no rigor, and suffered some degree of constitutional irritation; he did not, however, complain of any pain or fulness in the head. In the evening the pulse got up so high that one was almost tempted to bleed him; but a sweat breaking out, the pulse became reduced to 120. He had some thirst in the night and his pulse rose to 134. Equal moisture and heat of both arms, and he continued to enjoy the feeling and full power of the right hand.

On second day venesection ad ℥ij. There was still the quickness of the pulse, restlessness, want of sleep, forgetfulness, occasional wanderings of the mind. It was agreed that he should be first purged and then take tincture of digitalis, and, if requisite, have an opiate at night. In the afternoon the pulse was driving at a rapid rate and difficult to count; he complained of an occasional distressing cough, coming on in fits; he complained also of a soreness in his throat when he coughed or swallowed, and he pointed to the middle of his throat as the seat thereof. The digitalis was now commenced; ten drops at 4 p.m., fifteen minims at 8, twenty-five minims at 10 p.m., thirty drops at 2 a.m., thirty at 6 a.m. Pulse became reduced to 120, but still indistinct.

On third day, at 6 a.m., very little sleep; lower limbs dry and inclined to be cold; countenance natural; mental faculties perfect. Pulse 120, indistinct.

In the evening severe rigor, followed by profuse sweat; incoherent, violently outrageous, started up and jumped out of bed, requiring two strong men to hold him. Raved during the night. Inflammatory fulness and redness at the top of the sternum and left side of throat; dressings removed, and only a small quantity of reddish water was discharged. At this time the aneurismal swelling was in appearance quite removed, and both sides of the thorax were to the sight and touch perfectly alike.

On fourth day.—No sleep; raved a good deal, but was not violent. Cough not so distressing, and expectorated some mucus. During the night he complained a good deal of the right forearm and hand, at one time of numbness and at another of pain. The hand was held with the fingers folded in and rather stiffened. At 2 p.m. the forearm was distended at the insertion of the pronator teres, and also where the extensors of the thumb pass over the end of the radius; the hand and forearm cold; the fingers rigidly flexed. Mortification went on increasing, his delirium continued, and he died at 4 a.m. on the fifth morning, 110 hours after the operation.

Post-mortem twenty-six hours after death.—Suppuration under the integuments on the fore part of the throat, anterior to the sterno-mastoid muscles. Suppuration in the anterior mediastinum. The upper lobe of the right lung attached to the ribs by close and old adhesions. Between three and four ounces of fluid in the pericardium. The jugular veins, both external and internal, were of a deeper colour than usual. Heart rather soft, right auricle full, right ventricle less full than natural. No disease in any of the valves on either side of the

heart. Coagula were found in both ventricles. The venous blood was more fluid than usual.

Ou endeavouring to separate the aneurismal sac from the walls of the thorax it was found to have connected itself so intimately with the second rib as to have its cavity laid open by an attempt to disunite them. The form of that portion of the bone upon which the aneurism rested was changed from a flat surface to a cupped form. The extent of the altered part of the second rib was about half an inch.

The aorta with the great arteries springing from its arch and the humeral artery were removed from the body and examined the next day.

The aneurismal tumour *had extended more in length than in breadth, and had ascended so high as to have reached near to the spot on which the ligature had been applied.*

The tumour was nearly as large as a pullet's egg.

The artery immediately above the ligature was seen thrown into folds and furrows; on removing the ligature and slitting up the vessel its internal coat was found ruptured by the ligature only at one part, to the extent of about a quarter of its circumference. Through the remainder of the circle the internal surface of the artery presented a white line, obviously produced by the tightening of the ligature.

Two very small portions of coagulable lymph (clot ?) were found immediately above the ligature.

The trunk of the artery below the ligature was rather small.

The branches of the subclavian artery were not at all enlarged.

Mr. Colles draws attention to the leading features of the case :—1st, to the occurrence of gangrene after ligature, which he attributes to the inefficiency of the collateral circulation; 2nd, to the acute and diffused cellular inflammation and suppuration about the throat, anterior to the sterno-mastoid muscle; and 3rd, to the cerebral symptoms supervening on the second day, viz. delirium, &c., which were probably due to constitutional irritation.

CASE 69.   *Travers.—Sac punctured in the operation ; hæmorrhage ; death on third day.*

Wm. C—, æt. 73, a countryman, who had long been the subject of a cough, was admitted January 9th, 1828, at St. Thomas's Hospital, with a very painful, strongly pulsating tumour, as large as a swan's egg, pushing out the pectoral muscle and extending to the clavicle. He had first perceived a swelling on the right breast about three months ago, and it had since been gradually increasing. On January 17th the subclavian artery was tied above the clavicle. The sac having given way in the act of passing the needle, much blood was lost, and although the artery was perfectly secured the ligature did not command the bleeding, and it was found

necessary to introduce a sponge tent into the wound, by which the hæmorrhage was controlled.

On following day uneasiness down the spine; pulse 125 and bounding; respiration oppressed. Venesection ad ℥xvj; Magn. Sulph. ℥j 4tis horis.

On third day, for some hours, frequent spasmodic action of the diaphragm. Arm warm, but benumbed; pain along spine; breathing troublesome; great anxiety. Antimony ordered, with Hyoscyamus.

On fourth day breathing stertorous, pulse sank gradually, and he died in evening.

Post-mortem.—Lungs healthy; right pleural sac much inflamed, and contained twenty ounces of serum, with floating flakes of coagulable lymph. The aneurismal sac was nearly empty. Ligature firmly seated on the artery at the root of the sac and adjoining the outer edge of the scalenus. The sac had a pouch-like enlargement upwards, which closely overlaid the artery on the pectoral side; and this having been penetrated in the passage of the needle, had occasioned the profuse arterial hæmorrhage without saltus, which was not arrested by the tightening of the ligature.

Remarks by Travers.—The quantity of blood lost was so great that it was at one time extremely doubtful whether the man would leave the theatre alive. Pain in spine and diaphragm due to irritation of phrenic and cervical nerves. Could the circumstances have been foreseen, the operation would have been regarded as impracticable. The hæmorrhage was more terrific and uncontrollable than I ever witnessed. It commenced at the moment of passing the needle and was concluded to come from a rupture of the sac, being devoid of pulsation and not commanded by drawing the ligature tight and afterwards passing another above the first. His age, added to this circumstance, was thought to render the repetition of venesection beyond a single bleeding inadmissible. This was, perhaps, an error in judgment. Some attributed the inflammation of the pleura to the long exposure of the chest in the reduced state of the circulation; but the unavoidable introduction of a foreign substance into the wound, and the forcible separation and subsequent inflammation of the parts thereby occasioned, is a more probable explanation.

CASE 70. *Brodie.—Operation followed by pyæmia and death.*

Thomas A—, æt. 50, a stableman, living at Chelsea, admitted November 17th, 1831. A pulsating tumour is to be felt at the upper part and right side of the chest, in the hollow formed by the clavicle, ribs, and axilla. It is about the size of a small lemon, having its long diameter in the direction of the subclavian and axillary arteries. The pulsation is exceedingly distinct, and the peculiar thrilling sensa-

tion usual in aneurism is communicated to the hand. Pressure on the artery above the clavicle completely arrests the pulsation and diminishes the tumour, which, if examined under these circumstances, appears to contain some coagulum.

He complains occasionally of coldness and slight numbness in the right arm, but does not experience pain or uneasiness in any part of the body. He can use the right arm freely, and states "that he is not conscious of the existence of the tumour unless he places his back against the wall or any other firm body, when the pulsation in the part becomes very distinct. Pulse 62, slightly irregular, equal at both wrists. The arteries throughout the body pulsate more distinctly than natural, and with greater rotundity and fulness. No cough, pain in the chest, or palpitation.

He also states that about eight weeks ago he experienced violent pain in the right arm, chiefly in the course of the musculo-spiral nerve ; it was always relieved by moving the limb. First discovered the tumour seven weeks ago whilst shaving. It was unattended by pain, and has continued so up to the present time. He has not met with any strain or other injury in the situation of the tumour, and has had light work and good health for the last eight or nine years.

December 13th.—Sir B. Brodie tied the subclavian at the external border of the scalenus. The artery was very deep, and there was much cellular and adipose tissue between it and the skin. The artery was dilated to nearly twice its natural size, and the parts in the neighbourhood were consolidated by lymph, which had been previously effused. The whole arterial system seemed under considerable excitement, and the brachial artery on the right side was observed pulsating and exceedingly tortuous. This appearance ceased as soon as the ligature was applied, and the limb speedily became blanched.

14th.—Refreshing sleep during night; tumour diminished in size; no pulsation there or in the right radial artery. Right arm warm and moist, equal in temperature to the other. Complains of some pain in the course of the radial nerve. Skin hot, face flushed; pulse 96, round, full, bounding, irregular, and intermitting at every fifteenth beat ; respiration free. Antimony and venesection ad ℥xij. At 11 p.m. venesection ad ℥vj. At 12 p.m. restless, perspiring; no pulsation in radial artery or tumour.

15th.—Better, but has a catching cough, nearly allied to hiccough. No sickness or sweating.

17th.—Pulse 120, weak, intermitting, very irregular; slight hiccough; countenance pallid and anxious; manner hurried ; wound suppurating slightly.

18th.—Passed a restless night; inclined to sweat; no sickness or rigors; pulse hardly to be felt; countenance more sallow and anxious; inclined to delirium; pains in great toe of left foot, where there is an erythematous blush of redness, with swelling and tenderness. Ether, wine, and brandy.

19th.—Sinking. Circumscribed swelling on forehead above nose. Both feet and legs blue, and pulsation in femoral arteries very weak and irregular. Died at 1 p.m.

Examination twenty-four hours after death.—Body not emaciated, but had the appearance of gangrene. Both the lower and the right upper extremities of a dark purple colour ; the right forearm more especially affected, the back part of a green colour, the cuticle separating. The superficial veins seen ramifying

very distinctly over the surface of the body, and found to be filled with fluid blood.

The clavicle was first raised on the right side, the parts beneath here and there infiltrated with pus and serum. The scalenus anticus was then detached from the first rib; pus was found beneath it. The heart was removed with the vessels. The lungs were gorged with blood, but not inflamed. There was considerable hypertrophy of the heart.

The arch of the aorta, as well as the descending portion, much dilated, and with atheromatous and osseous deposit beneath the lining membrane.

The right subclavian artery much dilated. The ligature had been applied just where it emerges from behind the scalenus muscle, and a small coagulum occupied that part of the vessel nearest the heart. The whole of the serous membrane of the artery, together with that of the arch and descending aorta, was of a peculiarly bright scarlet colour, similar to parts which are undergoing inflammation; but there was no lymph. The subclavian was plugged up for about half an inch on each side of the ligature, which had begun to ulcerate through the vessel.

The artery beyond the ligature was considerably dilated, forming the sac, which was about five inches long and two and a half in breadth.

The whole of the sac was filled with coagula, some of which appeared recent, and some of older date.

The veins were healthy, but pus surrounded the subclavian vein externally, where it passes towards the axilla. The axillary veins were full of firmly coagulated blood. The parts about the artery, vein, and sac were much thickened.

On removing the sac pus was perceived to issue from behind the tendon of the subscapularis muscle.

The shoulder-joint was sound, and no absorption of bone had taken place about the ribs.

The femoral artery and vein, as well as the popliteal, were examined in the right lower limb. The arteries were filled with fluid blood, and of a red colour. The veins were filled with firm coagulated blood, but healthy in their tunics.

Description of preparation in St. George's Hospital Museum.—Prep. Series vj, No. 113. A dilatation of the third portion of the right subclavian artery. The vessel had been tied just beyond the outer border of the scaleni muscles. The aneurism was of a fusiform shape, being about five inches long and two and a half broad, the sac, as well as the vessel to the inner side of the ligature, being occupied by fibrinous coagulum. The subclavian artery, as well as the arch and descending thoracic aorta, was greatly dilated, the latter containing much atheromatous and calcareous deposit. The parts about the subclavian artery were very much thickened, and purulent matter was found infiltrated under the clavicle and around the parts wounded during ligation. Heart much hypertrophied, and lungs greatly congested.

CASE 71. *Auchinloss.—Operation followed by coma, &c., and death on fourth day.*

Robert B—, æt. 65, weaver, admitted in June, 1833. Under the left clavicle is a strong pulsating tumour, which extends in the course of the sub-

clavian artery, becoming axillary, from the outer margins of the *scaleni* to the middle of the lower third of the axilla. It is oblong and somewhat pyriform in shape, measuring fully six inches by two and a half in its shorter diameter. The portion of the tumour above the clavicle is less in thickness than the thumb, and tapers to a point at its apex, which is close to the outside of the *scaleni* muscles. The swelling at this point distinctly involves the whole circumference of the artery. The most prominent part of the tumour is below the outer half of the clavicle, being about the size of half a large orange, and projecting considerably beyond the anterior level of that bone. The clavicle is in no way displaced, and there is neither swelling nor discoloration of the integuments. The pulsation, which is synchronous with the beat of the heart, ceases on the artery being compressed against the first rib, when the tumour becomes greatly diminished, but immediately returns to its former size on the pressure being removed. The pulse at the wrist is very feeble, and the lower part of the axillary artery beats much less strongly than that of the opposite side. The affected limb is a little swollen and œdematous, and he has frequent pains and numbness extending to the fingers. There is no difference of temperature in the two arms, though he says the left is much more sensible to cold than the right. With the exception of cough and dyspnœa, both of which are aggravated on assuming the horizontal posture, his general health is in every respect quite good. Countenance cheerful, and otherwise free from all anxiety.

He states that the swelling made its first appearance above the clavicle eighteen months ago, when about the size of a field bean. From that time it gradually became larger, extending downwards in the course of the artery; but he represents its progress to have been much more rapid within the last month than at any previous period from its commencement.

He followed his usual occupation as a weaver until three weeks ago, when he was obliged to abandon it in consequence of the uneasy feeling in the arm. He is not sensible of having received any injury, and has used no particular treatment.

July 23rd.—Ligature of subclavian, as emerging from scaleni, was performed. The principal difficulty in the operation consisted in separating the matted cellular tissue from the surrounding nerves and blood-vessels, before coming down upon the outer edge of the scalenus; then the swollen state of the internal jugular vein, being fully twice the size of the thumb, and completely overlapping the scalenus. The dilatation of the artery was found to reach close to the acromial margin of the scalenus, so that the outer third of that muscle was cautiously divided through its entire thickness.

After the operation.—Had a good night; no feverish symptoms. On following day ordered antimony and salines; venesection to ten ounces. On second day again venesection to ten ounces, and remained in same state until evening, when he was first observed to be very drowsy, though when roused he appeared perfectly sensible. On third day passed a bad night; vomited; drowsiness increased; pupils contracted; pulse quick, irregular. Became more cheerful in afternoon, and little or no tendency to drowsiness; but in evening relapsed in comatose symptoms, and died apoplectic sixty-eight and a half hours after operation.

Post-mortem.—Effusion of serum on surface and into cavities of brain. Heart one third larger than natural, otherwise healthy. Aorta and different vessels

arising from it enlarged. Inner surface of aorta in parts thickened and rugous, and here and there small atheromatous deposits.

Left subclavian artery larger than right, about one fifth. Inner surface not thickened, but in several places between its origin and seat of disease small depositions had taken place. The inner and outer coagulum of lymph had formed, both being adherent to the internal membrane. The ligature was half an inch from thyroid axis. The enlargement commenced at the exit of the artery from between the scaleni, and betwixt this part and the clavicle its circumference was rather more than twice the natural size of the vessel, gradually increasing, however, from the scaleni downwards. Below the clavicle it became greatly larger, being fully two and a half inches in diameter. It continued nearly of the same size to within an inch of the base of the axilla, where it became suddenly less, the artery being scarcely the natural size at its exit from that cavity.

Remarks by Auchinloss.—With regard to the propriety of tying the subclavian artery much difference of opinion existed, as might be expected. Some of the gentlemen were against it, and others for the operation ; while a third party expressed a somewhat dubious opinion. Those opposed to the operation grounded their objections on the following circumstances :

1st. The advanced age of the patient, and consequently the great likelihood of the arteries throughout his system being in a morbid state.

2nd. The extent of the local disease being such as to preclude the possibility of applying the ligature to a sound portion of artery on the outside of the *scaleni* muscles.

3rd. The supposed aneurismal diathesis, from the sensation communicated to the fingers of augmented size of the opposite subclavian and carotid arteries.

On the other hand, those favorable to the operation considered it justifiable for the following reasons :

1st. Though the dilatation extended close to the outer margin of the *scalenus,* yet it seemed to stop there ; and, therefore, that muscle might be partly incised without injury to the phrenic nerve, and so held inwards as to permit of the ligature being applied to a sound portion of the artery in the second division of its course, between the scaleni muscles.

2nd. Though, from the age of this person, being above sixty, it was natural to infer that there might be morbid degeneration of the arterial tunics from atheromatous, calcareous, or steatomatous deposition, yet with this single exception, namely, his age, there was no other symptom or appearance indicative of the exist-

ence of such change. Moreover, it is well known that the operation for aneurism has often succeeded at very advanced periods of life.

3rd. The absence of an aneurismal diathesis. As to the augmented strength of pulsations in the opposite subclavian and carotid arteries, it is a symptom too often met with in cases of aneurism to be particularly insisted upon, in so far, at least, as it is not at all decisive of the existence of dilatation. In short, the presence of such a symptom is altogether deceptive in this respect.

4th. The perfect state of the collateral circulation for the maintenance of the vitality of the limb, after the application of the ligature. Had the tumour been so large as to have led to the supposition that the principal collateral channels were obliterated, the circumstance would have afforded, in my opinion, an objection to the operation in the case under consideration.

5th. The absence of any elevation or displacement of the clavicle, the presence of which would necessarily have impeded and rendered difficult the different steps of the operation.

6th. The general good health of the individual, he having left off working only three weeks prior to his admission into the hospital, in consequence of pain in the affected limb.

7th. The firm determination of the patient himself to have the operation performed. This of itself, however, ought in no case to justify the performance of an operation, and only deserves consideration when viewed in connection with other circumstances.

8th. The disease originated above the clavicle, and seems to have extended downwards. No greater error, indeed, can be committed than to neglect the operation at an early period of the disease.

The cause of death was the effusion of serum on the surface and into the cavities of the brain. This was doubtless occasioned by the disturbed state of the circulation, consequent on the operation. It is an effect the occurrence of which cannot be estimated previous to an operation such as that for aneurism ; for it may follow its performance in the most favorable case. This person's death, therefore, ought not in justice to militate against the propriety of the operation.

The patient had been in the hospital for upwards of a month, and during that period he was repeatedly the subject of having the tumour much more handled than it ought to have been.

CASE 73. *B. B. Cooper.— Operation followed by Pleurisy,
Pneumonia, Empyema, and Death.*

Richard P—, æt. 50, dark-haired, of sanguineous temperament, was admitted
into Guy's Hospital on Friday, May 13th, 1841, labouring under an aneurism of
the subclavian artery, on the left side.

His occupation has been, to navigate barges; and while thus employed, he has
been necessarily subjected to much violent and long-continued straining, espe-
cially of the muscles about the shoulder-joints. His habits have been intem-
perate, having freely indulged in the use of spirituous liquors; but he has gene-
rally enjoyed good health. Six weeks since, after some heavy rowing, he per-
ceived a dull aching pain, accompanied with a slight, ill-defined swelling, about
his left shoulder; which, from its having come on gradually, &c., he supposed to
be the consequence of an attack of rheumatism. For the cure of this, he made
use of embrocations externally, and stimulants internally; but, in the mean time,
continued to engage himself in his employment. Under this treatment, the pain
and swelling became so much increased that, in three weeks after his first notice
of the ailment, he was obliged to leave off work. The tumour had now begun to
protrude, in a defined form: any exertion produced a violent throbbing, from
which he could obtain relief only by holding the arm above his head; his elbow
had become numb; and he was deprived of rest at night. His appetite was not
impaired. During the following fortnight he remained at home, without attempt-
ing any means of relief; but at the expiration of that time all the above-men-
tioned symptoms being much aggravated, and, in addition, his arm having become
œdematous and slightly livid, there being also a sense of extreme soreness in the
axilla and a slight numbness about the fingers, he was induced to apply to the
hospital.

The following notes were made on May 17 :—

The clavicle is much altered in position, being thrust forward at the sterno-
clavicular articulation, and much raised at its acromial end; so that when the man
is standing square, it forms less than half a right angle with the clavicular portion
of the sterno-cleido-mastoideus muscle: the neck is on that side consequently
much shortened, and the depth of the first rib of course proportionately increased.
The tumour, which has thus displaced the clavicle, protrudes forwards below, and,
as far as is visible, is about the size of a turkey's egg; but it also rises up into the
neck considerably. The pulsation is forcible, is very evident below the clavicle,
and may be also readily felt by pressing the finger above and behind the clavicle.
No bruit is audible. The integuments are at present sound, but are very tender.
The heart's action is natural; excepting only that it is labouring, as if to overcome
the abnormal obstruction. Pulse 80, full, and labouring.

He describes the pain as most intense in the neighbourhood of the scapula and
in the axilla.

There is numbness along the whole arm, to the fingers.

Tongue white, furred. Face flushed. Perspiration profuse.

He is alarmed about himself; is irritable and impatient; and constantly seeking
some more easy position for the arm on the diseased side.

Mr. Cooper expressed some doubts, from the consideration of the symptoms and appearances, as to the propriety of attempting a cure by operation; or, if performed, as to whether it should be done on the distal side or not: but it having been determined, in consultation, to tie the artery in the usual way, external to the scalenus, this was accordingly done on the following day, March 18th. The artery was got at without any difficulty: no hæmorrhage, venous or arterial, retarded the progress of the operation: and the only impediment met with was in passing the ligature around the artery; which, although attempted by the use of one or two instruments invented especially to meet such difficulties, was eventually effected by an ordinary aneurism needle and ligature. The patient exhibited but little fortitude during the operation; his struggles and screams being violent and unceasing.

The arm and shoulder were enveloped in flannel.

Two hours after the operation the pulse of the right arm was 80, much as before the operation. The left arm of nearly the same temperature as the rest of the body. Face and forehead covered with a profuse perspiration. The patient very irritable.

9 p.m.—Pulse full, and 110: great pain between the scapulæ, also in the shoulder and clavicle: no pulsation can be detected in the tumour: sensation in the limb unimpaired. Bled to ℥vi.—Hydrarg. Chlor. gr. iij, c. Pulv. Opii gr. i.

May 19th, 9 p.m.—Pulse 120, very full, but compressible; perspiration profuse; breathing hurried and painful; pain between shoulders very severe; bowels not opened since operation. Haust. Sennæ.

2 p.m.—Bowels not opened; the same in other respects. Hydrarg. Chlor. gr. iij. Antim. Pot.-tart. gr. ¼ statim. Magn. Sulph. ℥i, Liq. Ant. tart. ℥ifs, Liq. Ammon. Acet. ℥ifs, Syr. Aurantii, ℥fs, Aquæ pur. ℥vi. Capiat coch. larg. duo tertiâ quâque horâ donec alv. respond.

20th.—Bowels relieved during the night, and constant diarrhœa since : for this he was ordered aromatic confection. Respiration difficult, accompanied with a troublesome cough. Pain between scapulæ extremely severe; respiration more difficult; pulse 130, small and hard. V.S. ad ℥viij. Hydrarg. c. Cretâ, gr. iij, c. Pulv. Doveri gr. iij, 4tis horis.

The urgent symptoms were so much relieved by the bleeding, that he had afterwards a tolerable night's rest.

21st. In the morning of to-day he felt relieved; but towards night his distressing symptoms returned. Pulse 130, but full and compressible. He suffers from diarrhœa. Confec. Aromat. 9i. c. Julep. Ammon. 4tâ quâque horâ.

22nd. Symptoms similar, but lessened in severity.

23rd. Diarrhœa continues; other symptoms much the same. Ordered to have a starch injection.

24th. Cough very troublesome. He is very weak, and appears to be jaundiced. Pil. Hydrarg. gr. i, Ext. Conii gr. iij, Pulv. Ipecac. gr. ss. quartâ quâque horâ sumend. Jul. Oxym. Comp. ℥i, Sp. Æth. Nitr. m xx, Tinct. Opii, m v, 4tis horis.

28th. Has been slightly improving : has complained chiefly of difficulty and pain in respiration and cough. His gums are slightly affected, and the evidences of jaundice have disappeared.

29th. Not so well in the morning, complained of increased difficulty in breathing.

At about one o'clock was seized with a violent rigor, which lasted for ten minutes, and left him very faint and weak.

30th. No more rigors; very weak; difficulty of breathing increased.

31st. Worse; breathing very laborious; pulse 100, jerking.

June 2nd. At about five o'clock p.m. a slight oozing of blood appeared from the wound; this was stopped by slight pressure and cold. Respiration very rapid, and painful. He wandered frequently. He is unable to remain in the recumbent posture for more than a few minutes at one time.

Half-past 9. Mortuus est.

The wound had apparently been healing favorably; the discharge, until a day or two before his death, remaining healthy in character and amount. He lived fifteen days after the operation. The ligature had not come away. It was doubtful whether there was any pulsation at the left wrist subsequent to the operation.

The friends would not allow a complete inspection to be made. As it was, however, a very interesting point to determine precisely the cause of death, the body was examined as far as possible without mutilation.

The whole of the parts involved in the operation were removed through the original opening.

Post-mortem examination.—The examination was made fifteen hours after death. The ligature was gone, having most probably been removed, during the cleaning of the body, by the nurses. The wound was fetid, apparently from the discharge about it. The edges of the wound, and the parts immediately exposed to the air, were sloughy; the slough did not extend beyond the surface. A large vein ran transversely across the lower part of the wound. The phrenic nerve was *in sitú*, but glued down by a quantity of adhesive matter below. On cutting into the sac, for the purpose of removing the parts, a quantity of coagulum escaped. The space between the sac and the edge of the scalenus, and consequently between each and the part to which the ligature had been applied, was very small. The artery was completely divided by the ligature. The divided extremity towards the origin of the artery was patulous, of the same diameter as the healthy portion nearer the heart; not apparently contracted at all, and could scarcely be said to be plugged by the coagulum, so little was there. About the eighth of an inch from its margin was a large arterial branch—perhaps the transverse cervical; this was quite pervious. The opening of the artery into the sac was very small. A portion of the apex of the left lung was brought away; it adhered strongly to the artery and parts about; was studded with small soft tubercles; and appeared pneumonic.

On percussion, the chest was dull everywhere, excepting at the apex on the right side.

A puncture was made into the chest on the left side by means of a trocar and canula; and on withdrawing the trocar (which, from the freedom of its motion, was supposed to lie in the pleural cavity), a quantity of thick yellow pus escaped through the canula.

A similar opening being made on the right side, considerable resistance was offered to the movement of the end of the trocar within the chest; and on withdrawing it, no pus escaped. Afterwards, on removing the canula, having previously thrust it into and about the lung forcibly, several small portions of lung,

filling up the tube, were brought away. On examining them they appeared to be hepatized and solid, no portion apparently remaining pervious to air.

B. B. Cooper, in his remarks on the above case, mentions the circumstance that in performing the operation, whilst proceeding to get the ligature round the artery, but some time before this was effected, he observed, to his great surprise, that all pulsation in the aneurismal tumour had ceased; nor did it ever recur, although the aneurismal needle was removed from under the artery several times.

Mr. Green, who was present, stated that he had once remarked the same circumstance whilst performing this operation.

Case 74. *Blaker.—Death from hæmorrhage.*

J. T—, æt. 59, admitted May 24th, 1855, by trade a haybinder; general good health; a spare made man, with contracted features, small bones, narrow chest, much arched clavicles. Has a pulsating tumour beneath the acromial end of right clavicle, and extending into the axilla; about the size of an orange. It feels hard and elastic, and cannot be emptied by pressure; it is evidently beneath the pectoralis major; it pulsates, and is arrested by pressure on the subclavian. Double bruit distinctly audible. He complains of great pain both in tumour and down the arm, which is partially paralysed. He states that two years ago, while at his employment, he felt a sudden pain in the right shoulder, but not sufficient to prevent him from work. From this time he has always been subject to pain in shoulder, which he considered rheumatic. About nine months since, he first perceived a swelling in front of his shoulder, and from that time it has continued to increase in size.

His health has lately begun to suffer, being worn down with pain and defective nourishment. Pulse 70, and full and soft in left wrist, but much more feeble in right. He was given ordinary diet, allowed to take moderate exercise in the air, and to use a spirit lotion to the tumour as a *placebo.*

January 25th.—Ligature of subclavian artery close to scalenus. Obliged to divide clavicular portion of sterno-mastoid and external jugular vein. Operation performed without chloroform. Pulsation in tumour and at wrist ceased.

2nd day.—Some slight fever; pulse 100, full, bounding. Vin. Ant., Tr. Digitalis āā ♏xv, ex. Haust., Salin. ℥j, 3tis horis. The medicine occasioned great nausea, and entirely reduced the excessive action of the heart.

3rd day.—Going on remarkably well. No diminution in the temperature of the arm.

9th day.—Kept on low diet up to the twentieth day. No bad symptoms; allowed a little solid food. In evening complained of pain in right side of neck; and about midnight suddenly woke up, and had profuse hæmorrhage, losing about two pints.

10th day.—Much blanched; pulse 80, soft, very compressible; ordered Gallic acid and digitalis; lint dipped in iced water applied to the wound.

11th day.—Severe rigors; slight hæmorrhage; but readily controlled by pressure. Had another severe hæmorrhage in the afternoon.

12th day.—Considerable hæmorrhage in the morning, and several slight attacks during the day. At two p.m. hæmorrhage with severe force and dyspnœa; sinking. Died at half-past five.

Post-mortem, twenty-four hours.—The subclavian artery itself appeared in a healthy state nearly up to the ligature, where it was found to have sloughed, and a large opening to exist.

On the distal side of the ligature all the parts were in a sloughing condition.

There was *not more than a quarter of an inch* of artery undilated between the sac and the spot where the ligature had been applied.

The aneurism was nearly spherical, and extended chiefly into the axilla, pressing likewise on the upper part of the pleura. The two upper ribs had become partially absorbed. The sac contained a large clot, together with a considerable amount of fœtid grumous fluid, which was also found in the artery as far as the ligature.

On the proximal end of the ligature there was a small unhealthy-looking clot and slight atheromatous deposit, which increased considerably on approaching the heart.

Aorta and pulmonary arteries much dilated; the former thickly covered with atheroma. Heart somewhat enlarged; valves thickened.

Lungs and liver healthy.

CASE 75. *Paget.—Pyæmia; death from hæmorrhage.*

John R—, æt. 54. Tall, strong, healthy-looking, and temperate. Formerly soldier in the guards. In the upper part of the right axillary space was a tumour pulsating strongly, of the size of an orange. He states that three or four months ago he suffered very severely from what he called rheumatism about his right arm. This gradually subsided, and he next felt a sensation of numbness all down the arm, and especially in the fingers. He only discovered the tumour accidentally ten days before admission, whilst washing himself. He said that it had increased gradually since. The patient looked older than he was, and had well-marked arcus senilis. Nothing wrong detected about his chest.

Compression tried by Rowlandson's apparatus, but could not be managed.

June 26th.—Under chloroform ligature of third portion of subclavian artery, close to outer border of scalenus muscle. No veins wounded or tied.

He went on well; had a little cough on the 3rd day.

On the 13th day a very small clot of blood at the wound, believed to have arisen merely from the granulations.

He still improved in every respect until July 14th, early on the morning of which day he had a decided rigor, which lasted for twenty minutes; lips blue, face livid, feet and hands cold. On dressing wound the lint was saturated with blood, which had dribbled down from the shoulder. He had pain and numbness down the left side. Quinine in five-grain doses every two hours; wine, brandy, beef tea. The symptoms were considered to be due to commencing pyæmia, and not to suppuration of sac.

The man rallied subsequently, and began to mend. On July 16th the ligature

came away, and the wound was healthy excepting one small spot, but discharged rather a large quantity of pus, probably connected with the sac of the aneurism.

On the 19th, singing in the ears and slight deafness. Quinine only every three hours.

On the 21st, had an attack of acute pain about the right elbow-joint. The cellular tissue about this part became inflamed, and subsequently in the axilla and under the pectoral muscle. Endeavours to make a counter-opening in the axilla, but no communication established. Patient began to have profuse perspiration, preceded by rigors. He grew weaker; the whole limb much swollen, and red and inflamed about elbow-joint.

August 6th.—Hæmorrhage to twenty ounces, from small opening of operation, in a gush, produced much exhaustion. Pus let out from near elbow in large quantity, and bone found quite bare. He rallied.

10th.—Severe rigor, and a pustular eruption on arms and chest noticed.

17th.—Another hæmorrhage to ten or twelve ounces, and again on 29th to five or six ounces.

30th.—Another attack, from which he never rallied, and died in the afternoon.

Autopsy.—A firm clot discovered at the seat of ligature, which had temporarily occluded the vessels. Veins around perfectly healthy. In the subclavian artery, anterior to the ligature, and in the right carotid, were found some pale fibrinous clots. Coats of the artery undoubtedly healthy; here and there a patch of atheromatous deposit. On removing the clavicle an aneurism was found above and one below the position of the clavicle. Both sacs had suppurated. The one above was the size of an orange, the one below as large as two fists. The artery on the first rib was pervious, for a probe passed easily down to the lower sac. The brachial was found very small, but its coats healthy.

The veins of the limb and those of the lower extremity were remarkably free from pyæmic deposits. Elbow joint quite denuded, and cartilages gone. Right shoulder-joint healthy; the left filled with thick pus, and cartilage easily stripped off.

Lung œdematous, parenchyma healthy. Numerous small dried-up cretaceous tuberculous masses throughout. In right lung a small purulent deposit; left free. Heart big and flabby, no appearance of fatty degeneration. Aortic valves rather thickened, and ossified; the other valves healthy.

The coats of the aorta thickly studded with atheromatous deposits.

Liver pale, easily broken down. Kidneys healthy. Brain much congested, and firm.

At base of brain right internal carotid natural; left studded with atheromatous patches.

Case 78. *Liston.—Death from hæmorrhage.*

John M—, æt. 43, travelled from the Highlands 150 miles, and on his arrival on 12th September, 1826, presented himself to me with a very large pulsating aneurismal tumour in the right axilla. It seemed to pass *upwards, underneath the clavicle,* which it had considerably raised, and downwards to below the border of the axilla, pressing in the ribs and flattening the chest. The projection of the tumour under the larger pectoral muscle was of immense size, and compared to that of a common-sized foot-ball. The limb was enormously swollen, the upper part hard, the

lower part soft and œdematous, as was also the side of the chest. The pulse was imperceptible at the wrist. The patient had lost the power of motion and sensation in the limb, yet the temperature was natural. About Christmas, 1825, he had fallen on the ice with his arm stretched out, and to that accident he attributed the violent pains he experienced. They were at first supposed to be rheumatic; and it was only about ten weeks before setting out for this city, that he was made aware of the nature of the tumour, which shortly before he had observed in his armpit. The patient was allowed a day's rest, and on September 14th the operation of tying the subclavian was performed.

The ordinary operation for tying the artery in its external third was made, and the ligature passed round the artery, which was observed to be much enlarged. A good deal of blood was thrown out with considerable force, but restrained and stopped entirely after pressure with the finger. The ligature was then tightened, and with the effect of arresting the pulsation in the tumour. I was not satisfied with this ligature, apprehending a return of the bleeding. I made more room by dividing the transverse artery of the neck and the posterior belly of the omo-hyoid, and exposed the artery again about three quarters of an inch nearer the heart, and close to the edge of the anterior scalenus muscle. The artery was here still more dilated, thick, and soft in its coats, and aptly enough compared to the finger of a buckskin glove; it was observed to rise very abruptly forward after emerging from the edge of the muscle. I did not consider myself justified in going nearer the heart, considering the state of parts, and contented myself with passing a pretty thick ligature round the vessel, close to the edge of the muscle.

Everything went on well for some days; the heat of the limb never rose much above the natural standard; the tumour began to collapse; sensation returned; a slight pulsation could be felt in the radial, and the patient was relieved from pain. Venesection was once had recourse to, on account of the full strong pulse.

On the morning of the thirteenth day slight oozing of blood, and again in the evening. On the fourteenth day slight oozing of very dark and putrid blood, which recurred in the evening to a considerable extent. It was arrested by compress, &c., but the patient did not rally.

Post-mortem.—The tumour occupied the whole axilla, was compressed a little by the clavicle, passed up to the edge of the scalenus, having the artery stretched over it. The vessel had given way immediately below the giving off of the thoracic humeraria, and from that point to the edge of the scalenus it was firmly attached to and incorporated with the tumour, and in fact contributed to the formation of its coats. The upper or second ligature was found detached, embracing a slough and lying loose among them. The first or under ligature was still attached, though ulceration had occurred there also to a considerable extent. This ligature lay in the sac behind the subclavian, and from this perforation had proceeded the hæmorrhage which occurred on withdrawing the needle. At neither of the points of deligation was there much appearance of reparation. There was no clot in the artery, except at the upper opening, which was soft and bloody. and though the vessel was a good deal contracted, the adhesions were slight; the axillary vein was firmly adherent and obliterated about three inches below the clavicle. Below the tumour the humeral artery was discovered emerging, of a very small size, and completely filled by a firm coagulum.

The fatal result is to be attributed to the unfavorable alteration in the coats of

the artery, and to the great size of the tumour.—(Prep. Roy. Coll. Surg. England, No. 1695.)

CASE 84.   *Gregg.—Death from hæmorrhage.*

Dennis K—, æt. 40; sanguine temperament; slightly made. Formerly soldier in Queen of Spain's service; of dissipated habits. Since then employed as labourer, and latterly occupied as porter in a tobacconist's shop. Became an out-patient in the Infirmary, Cork, on July 29, 1857. Complaining at present and for three months previously of an intense burning pain in the right shoulder and arm, accompanied by numbness, which he attributed to rheumatism, and for which he had been treated. This pain, he stated, was moderate in the daytime, but considerably aggravated at night, so much so as frequently to deprive him of sleep and oblige him to throw himself out of bed. He says he has not been subjected to any severe labour, such as carrying heavy loads, but that his occupation exposed him to wet and cold, without the opportunity of changing his wet clothing. About a fortnight after the commencement of the pain he observed a small tumour under the centre of the right clavicle, gradually increasing in size up to the present, at the same time varying much according to position.

On examination, a large pulsating tumour was found extending from under the external two thirds of the clavicle (which was elevated about one inch) down into the axilla, the anterior half of which it nearly occupied. On placing the hand over the tumour, the *frémissement cataire* was very perceptibly felt, and on auscultation the *bruit de souffle* was distinctly audible. The anterior portion of the right subclavian region was perfectly clear on auscultation and percussion; but the inferior part of the right mammary region, extending from the nipple downwards, was particularly dull, and the sounds of the heart were conveyed as if through a solid body; the left side was perfectly clear, presenting nothing abnormal; there was a slight *bruit* distinguishable in the cardiac region, but this appeared to be a reflected sound from the aneurismal sac, otherwise the heart's action seemed natural. The pulse at this time was quick and strong, the tongue slightly loaded, bowels constipated. This was relieved by a mild aperient, small doses of tincture of digitalis, and an anodyne at night. This treatment was continued for some days, and on August 7th, after consultation, it was determined to operate. Ligature of the subclavian at commencement of the third portion performed. Difficulty experienced in finding the vessel, owing to the displacement of the clavicle and the other parts by the tumour. The right lung and pleura were also considerably pushed up. Whilst separating with the finger the areolar tissue, so as to expose the artery, a gurgling sound, as of the suction of air either into a large vein or pleura, was heard, but almost immediately ceased. Pneumonic symptoms supervened. Put under mercurial treatment.

On the sixth day severe pains in left knee, which was red and puffy; respiration natural; wound commencing to suppurate; sac solid and much diminished in size. Pyæmia feared. However, as there was amendment, the pains were thought to be merely arthritic. In evening he became exceedingly restless and delirious, and frequently flung the affected arm out of bed. He had also a chill, not amounting to rigor, and became hot and flushed.

On eighth day sudden gush of 16 oz. of arterial blood from wound. Saturated solution of alum, and pressure.

Recurrence on morning of ninth day, and he sank from exhaustion at 1 a.m., August 17th.

Autopsy twelve hours after death.—Sac covered by both pectoral muscles, and intimately adherent to the four first ribs, and extending from their junction with the cartilages about four inches backwards. Calibre of thorax very much diminished from above downwards, the diaphragm being much more convex, pushed up by the liver, which was considerably hypertrophied, weighing about 8 lb., and extending as high as the lower margin of the fourth rib. Some serum in right pleural cavity, and engorgement at base of right lung; otherwise lungs on both sides healthy, excepting two or three tuberculated spots on anterior surface of left lung, and a small quantity of coagulated lymph on free margin of both lungs. No appearance of wound in upper part of right pleura. All the parts matted together by inflammatory processes of union of external wound. Pericardium healthy. Heart slightly hypertrophied. A large abscess was found containing about 6 oz. of dark, badly formed pus, extending from internal edge of wound downwards and backwards under the trachea and arch of aorta to the right side of the bodies of the second and third dorsal vertebræ, external to the pleural cavity. Valves of heart perfectly healthy. Aorta of natural size, as well as innominate; internal lining membrane of latter presented some slight traces of atheromatous deposit. Upon opening and tracing the right subclavian artery to the disease, a firm coagulum was found filling the cardiac side, about one inch in length, close to the ligature, which had not completely cut through the artery. The coagulum was very firmly adherent to the coats, so that it was difficult to ascertain where the hæmorrhage came from; but the internal mammary artery opened at the distal side of the ligature, and may, from its free anastomosis, have been the source of the hæmorrhage. All the other arteries were perfectly normal. The tumour contained about 12 oz. of black, semifluid, decomposing blood; a firm coagulum, about the size of a walnut, occupied the opening of the artery into the sac, which was evidently of recent formation, and prevented the possibility of any fluid passing from the artery into the tumour.

Remarks by Gregg.—Why pneumonia should have shown itself was totally unaccountable. However, the necessary exhibition of mercury did not, as is usually supposed, prevent the proper formation of fibrine, as the clot formed was so firm and adherent that, had there been union in the coats of the vessels, the cure would have been complete.

CASE 83.   *Jobert.—Death from hæmorrhage.*

Male, æt. 61, a sawyer for the last ten years. He had only noticed the swelling about the clavicle for six months, when he applied to a surgeon, who prescribed a blister over it, but this had no effect. He subsequently entered the hospital.

On admission.—No deformity of the axilla; only under the clavicle and under

the most external part of the pectoralis major there was perceived a considerable swelling. The tumour was rounded, of the size of a goose egg, forming a projection forwards four lines in front of the level of the clavicle; skin natural; pulsation seen and felt in axilla.

No adhesion of the skin, but it was much thinned and could be raised off the tumour. This was situated beneath the clavicle, so that one could not ascertain its degree of adhesion to the parts behind. Pulsation uniform over whole surface of tumour, and dilatation equable. *Above the clavicle the artery appeared dilated, and in the subclavian fossa* one could say that it was equal in diameter to that of the thumb (at least double that of the opposite artery). Pulsation here was much stronger, and extended as far as the scalenus. In front of the scaleni, under the sterno-mastoid, and internal to latter, the pulsations were still very strong, but not quite so much so as outside the scaleni. On inserting the finger deeply there was the same characteristic of amplification as in tumour, and on feeling artery above clavicle a thrill was detected; on compressing the vessel the tumour ceased to pulsate. The *brachial* did not appear dilated, and seemed to be of the same size as on the opposite side. On compressing this artery the pulsation of the tumour did not increase in a very decided manner. *Over the centre of the tumour two bruits were heard;* the one more dry, sharp, metallic, hard, and corresponding to shock of blood against portions of the tumour and dilatation thereof; the other stronger, clearer, more easily heard, less dull, and corresponding to the systole of the tumour and expulsion of the blood. These bruits were heard through the whole extent of the tumour, and presented no variations in their intensity or in their rhythm. Above the clavicle these two bruits were perceived; but the second one was more decided and clear than in the tumour. The first was also clearer and stronger, although less prolonged. Over the innominate artery the first sound was more prolonged, more extended, and more distinct still; the second sound presented the same characters, but to a less considerable extent. Pulsation of the right carotid was stronger than that of the left.

The clavicle preserved its form and proper direction; and on comparing it with the opposite one it felt more thinned, and one perceived in its middle part the impulse of the pulsations.

Movements of shoulder and arm natural. There was less force in it than in the opposite; and sensation good. Numbness and tingling in fingers. From shoulder to elbow the limb was thin; on measuring around arm below axilla there was half an inch difference in circumference; no difference in forearm. Temperature equal. Pulse 48, more feeble, more compressible than left, and the slightest pressure stopped it; quite regular. Chest healthy. No dyspnœa; no oppression of breathing.

Since his admission he has been kept in bed, and had venesection twice. During first eighteen days ice was applied continuously for eight days, and then suspended for two hours, but again replaced. Low diet, no meat. Under this the tumour diminished, and pulsation became less strong. After much doubt as to which operation to perform, viz. ligature, internal or external to scaleni, Brasdor's, or laying open sac and tying both ends, it was decided to tie artery external to scaleni.

The operation was performed on November 22nd, 1837, and lasted one hour. There was great difficulty in consequence of adhesions of artery to parts behind. The vessel was found enormously large, equal to size of an aorta; it was nine lines in diameter throughout; pulsation very marked. The coats, although more

thickened and less elastic than usual, did not appear to have undergone any serious changes. The cellular coat appeared healthy; and it was hoped that the dilatation was only one of hypertrophy without organic alteration.

A precaution was taken in tying knot on artery by placing a small piece of diachylon plaster under it, in consequence of the diseased condition of the vessel, and to avoid cutting through the coats.

Symptoms after operation.—Not the slightest difference in temperature. On following day it was thought that pulsation could be felt in radial; but this was questionable. Pulsation in tumour quite gone, and it was lessened in size.

On the 5th day, at the inner and lower part of the tumour, over the second and third intercostal spaces at sternum, a very marked pulsation, extending towards the tumour. Above the sternum, at fossa, very distinct and extensive pulsation of the arteria innominata. On the 14th day an abscess was opened on the back of shoulder.

During the early part of December (nine to fourteen days) the pulsation of the innominata and that of the intercostal tumour considerably diminished in extent, although always persisting.

After the operation the pulsation never reappeared in the tumour (aneurismal sac), and from this period a notable diminution has taken place. Limb has preserved its heat and sensibility, and no pulsation exists in course of brachial or radial. Copious suppuration from both wounds. Sleeps well, respiration good, intellect clear. From the 18th day began to grow increasingly weak and emaciated. On the twenty-eighth day after the operation, without any cause, hæmorrhage from ligature wound, to extent of ten ounces. Less red than arterial, but less dark than venous. Extreme agitation and fear of death. Hæmorrhage stopped, and reappeared in an hour, but only to two ounces. Then it ceased entirely. Light compression relieved by bandage. No further hæmorrhage, but he died from exhaustion on twenty-ninth day.

Post-mortem.—The aneurismal tumour was of the size of a turkey's egg, and fusiform; the chief dilatation was at a level with the clavicle, and gradually tapered *below* towards the axilla opposite to and a little beneath the origin of the posterior circumflex artery, whence proceeded a natural size brachial artery; *above* it extended to within an inch of the external border of the scalenus, and at this point the fusiform enlargement, although it ceased, yet the arterial trunk did not assume its natural calibre, for from thence to the origin of the artery the subclavian was of the size of an ordinary healthy aorta. The dilatation was exceedingly adherent to all the neighbouring parts which were implicated, and more especially to the brachial plexus. On examining the parts where the ligature was applied, the two ends of the tied artery were found plunged into a depôt of pus, and surrounded by a kind of pyogenic membrane, which seemed to have reunited the two opposed ends of the vessel by adhering to the confines of their external coats. There was no clot formation in their interior.

The aneurismal sac contained clots, of a softened blackish grumous character; at the lower termination of the dilatation the calibre of the vessel was completely obliterated by a red clot, consistent and adherent to the internal coat; the upper termination of the subclavian was occupied by a clot of the same nature as that in the sac itself, and without any adhesion to the arterial parietes.

The heart and valves were healthy. The arch of the aorta and the descending

aorta were enormously dilated and presented innumerable cartilaginous concretions. The arteria innominata ·was dilated to the size of an ordinary aorta, uniformly in its whole extent, and near its bifurcation there was a small projection of the size of a nut, and presenting itself at the second intercostal space. The right carotid was dilated.

There was extensive suppuration among the muscles of the scapula; the lungs were healthy, and the apex of the right one was adherent to the first and second intercostal spaces.

CASE 85.   *Seutin.—Death from hæmorrhage.*

Peter D—, æt. 44, admitted into the Hôpital St. Pierre, on June 25th, 1834, with an aneurism of left subclavian artery, as to the existence and nature of which the following symptoms leave no doubt. A man of strong constitution, but deteriorated by anterior diseases and especially syphilis. The tumour was developed slowly, and was situated at upper and left part of the thorax, below the clavicle, commencing at the junction of the inner third with the middle third of that bone; it was directed towards the axilla and raised the superior part of the pectoralis major muscle, by which it was covered. Its form was ovoid, its great diameter was transverse; its size, at least that of a hen's egg. The skin was neither hot nor red, and its pulsation was synchronous with the pulse; and on auscultation a well-marked bruissement was heard; on compression all pulsation ceased in the left radial artery. The tumour was the seat of very acute pain, extending down the arm. Pulsations were also felt in the supra-sternal fossa. He had also very severe dyspnœa and cephalalgia; the carotid arteries beat with great violence; pulse hard and full, 80; in the left arm it was weaker and easily compressible.

The chest was carefully examined, and found perfectly healthy throughout whole extent. Nevertheless, the pulsations remarked in the sternal fossa, the dyspnœa, the accesses of asthma for which he had been in the hospital several times, caused a doubt as to the integrity of the heart, large vessels, and the pulmonary organs.

The patient was submitted to almost complete abstinence. Two venesections, the one to eighteen ounces, the other to twelve ounces at four days' interval. Small doses of Digitalis could not be borne; castor oil to correct obstinate constipation. A temporary compression was made from time to time on the subclavian artery by the thumb; and as no inconvenience resulted permanent compression was tried, but could not be maintained on account of intense pain.

On the 7th July pain insupportable; the aneurism had increased considerably within the last few days; the arm swelled; all the subcutaneous veins were enlarged; the man was wearied and anxious.

On July 9th ligature of subclavian artery external to the scalenus; great difficulty in the operation; trunk of nerve mistaken for artery, and had to be excluded from ligature. Pulsation ceased in the tumour and in the radial pulse; he went on well; the limb preserved its heat, mobility and sensibility; and the pain nearly disappeared, but he had no return of his asthma. Suppuration on July 12th. On July 17th he sat up on sofa. Pulsation never reappeared in the tumour, which was much diminished in size.

On July 28th, twenty days after operation, the ligature came away. Patient got up and was thought to be nearly cured.

August 3rd.—Wound healthy and suppurating. One hour and a half after getting up a hæmorrhage took place from the wound, which had become pale; the jet which escaped was the size of a quill pen, to extent of eight or ten ounces and of vermilion colour; this was arrested by compression, at first with the fingers and afterwards with compresses confined by bandage and strapping. The pulse being hard, full, and quick, three small venesections at several days' interval. Restricted diet enforced. Pulse became normal, and recovering; all danger seemingly passed.

12th.—A fresh hæmorrhage occurred, arrested by the same means as the first. Hæmorrhage reappeared the following night, and, although the patient had only lost twenty ounces of blood in these three attacks, he was in an alarming state. Pulse quick and small; face altered, yellowish tinge; respiration uneasy; cellular tissue and glands about wound enlarged. Hæmorrhage reappeared on five different occasions again, and he died on the night of the 13th.

Necropsy.—At the upper and anterior part of the left side of the chest there was a roundish tumour, projecting into the interior of the thorax between the first and second ribs, and belonging to the external aneurism; this was adherent by its upper part with the lobe of the lung. There were pleuritic adhesions on both sides, and in the left cavity there were four to five ounces of serous fluid; the lungs were healthy. The heart, although fatty, was firm; traces of old inflammation in the right ventricle. Arch of aorta and thoracic aorta as far as the cœliac axis were more than double their natural size. The aneurism was situated immediately below the clavicle, covered by the pectoral muscle, which was unchanged in structure, but the second rib was carious and partly destroyed, allowing aneurism to project internally; the sac was filled with fibrine. The brachial artery was of its normal size and character. All the collateral branches on cardiac side of the aneurism were considerably enlarged. The subclavian artery had been divided throughout its whole calibre by the ligature (which had not included any nerve); it was macerated by the suppuration. The cardiac portion of the subclavian (or that communicating with aorta) was inflamed and altered to the extent of two inches from the seat of ligature, and there was no appearance of clot at this point. The subclavian artery on the distal side of the place of ligature, and about two lines off, presented a roundish opening, at least two lines in diameter, which seemed to have been caused by inflammation and the corrosive action of the suppuration. The different branches of the brachial plexus, especially those forming the median nerve, were intimately adherent to the aneurism.

Remarks by Seutin.—The patient lived thirty-five days, and during that period there was never any return of the radial pulse, and yet the limb preserved its heat, mobility, and sensibility, and there was no appearance of gangrene. The cause of failure of the ligature seemed to be due to the difficulty in procuring a ready issue to the suppuration, so that by the long retention of the pus at the bottom of the wound inflammation,

corrosion, and disorganization of the walls of the artery took place, and caused the large opening found in the vessel after death.

General summary of the twelve deaths after ligature of the third or second portion of the subclavian artery for sub-clavio-axillary aneurism.

1. *Sex.*—All twelve patients were males.

2. *Age.*—Forty years and upwards, viz., 40, 43, 44, 48, 50, 50, 54, 59, 61, 65, 73 ; age in one not stated.

3. *Situation and cause of the aneurism.*—All were subclavio-axillary aneurisms, eight being on the right side and three on the left ; in one the side is not stated.

Of the three left aneurisms, two were of spontaneous origin, and evidently due to atheroma, as proved by the examination of the vessels after death ; the third case was in a man, æt. 50, of intemperate habits, who had been subjected to much violent and long-continued straining in his occupation as a navigator of barges, and had, no doubt, diseased arterial tunics, although this could not be substantiated through want of pathological investigation.

Of the eight right aneurisms, six were purely spontaneous in their origin. Five of the patients were proved to have had an atheromatous condition of the arterial system, and the sixth probably also (although this is not stated), inasmuch as the patient was seventy-three. Two were attributed to falls, Cases 68 and 78, but in the latter there was found disease of the coats of the vessel, so that the injury was merely accessory to the formation of the aneurism, and in the former the condition of the vessels was not ascertained after death, and the history of the case rather tends to the supposition of arterial disease.

4. *The duration of the disease previous to the operation.*—This is always a doubtful point, and can only be regarded as determined approximatively. The record gives only six weeks in Case 73, two months in Case 70, three months in Cases 69 and 84, four months in Case 75, six months in Cases 68 and 83, nine months in Case 78, eighteen months in Case 71, two years in Case 74 ; and in two cases, 81 and 85, the duration is not stated.

5. *The size of the aneurism,* at the time of the operation, was

in Case 85 that of half a hen's egg; in Cases 68 and 83 that of a goose's egg; in Case 73, turkey's egg; Case 69, a swan's egg; in Case 70 that of a small lemon; in Cases 74 and 75 that of an orange. It was pyriform in Case 71, large in Case 84, and the size of a foot-ball in Case 78. In Case 81 the size is not stated.

6. *The previous treatment.*—In three cases the Valsalva treatment was resorted to before the operation, viz. Cases 68, 83, and 85.

7. *Respecting the operation itself.*—

No difficulty in the operation occurred in four cases, Nos. 73, 74, 75, and 84.

In two cases, 68 and 74, the *division of the external jugular vein* was found necessary, and both were ends tied without any subsequent ill effects.

In one only, Case 71, was it requisite to *divide the scalenus* muscle, but only partially; this occurred on the left side.

In three cases, 70, 71, and 83, there was *much difficulty* in the operation, owing to the induration of the tissues around the vessel from previous inflammation, &c.

In one case, 78, *the artery required to be tied in two places*, owing to the inefficiency of the first ligature.

In one case, 69, the *sac was punctured* by the aneurismal needle in the operation, and probably this was so in Case 78 likewise.

8. *The after consequences and causes of death.*—These points we have to consider under two distinct heads—first, those in which no hæmorrhage took place, and, secondly, those cases in which the death was due to hæmorrhage.

The first set of cases comprise four cases, No. 68, 70, 71, and 73.

In Case 71 the man, æt. 65, died three days after the operation from apoplectic symptoms, due to serous effusion on the brain, and preceded by febrile symptoms and drowsiness.

In Case 68, that of a man, æt. 48, death also supervened on coma on the fifth day; the cerebral symptoms set in on the second day, and were considered to be due to constitutional irritation, occasioned by the acute inflammation and diffused suppuration of the cellular tissue about the throat, as well as gangrene of the limb.

Case 70.—Æt. 50; died of pyæmic symptoms on the seventh day, there being much suppuration about the seat of ligature.

Case 73.—Æt. 50; lived thirteen days.   He had pleurisy and pneumonia, with empyema supervening, which was considered by some to be due to the injury done to the pleura in the operation.

The second set of cases embrace two thirds of the deaths, viz. eight in number.

(*a*) *Primary*—from the accidental wound of the sac in the operation,—in Case 69.

(*b*) *Secondary*—1st, *from the sac itself,*—in Cases 75 and 78; in the one probably due to the operation, and in the other evidently to ulceration and suppuration of the sac.

2nd, *from the vessel itself where ligatured,* five cases ; one case, 84, due to the accidental stretching of the artery on the ninth day; three cases, 74, 83, and 85, from spontaneous ulceration and failure of clot-plugging ; and one case, 81, particulars not stated.

The following is an abstract of the particulars of the secondary hæmorrhages :

In one case, No. 81, there were no satisfactory details, the only record being the fact of the patient dying of secondary hæmorrhage after ligature of the third portion of the subclavian for a subclavian aneurism.

In one, Case 84, the death occurred on the ninth day from hæmorrhage arising, on the day before, from a sudden stretching of the ligature on the artery, which was still firmly fixed,—thus causing a partial laceration of the vessel.

In Case 74 death took place on the twelfth day, the hæmorrhage having set in on the ninth day, from ulceration and sloughing of the artery at the seat of the ligature, which was still retained.

In Case 78 the hæmorrhage set in on the thirteenth day, and death ensued on the following day ; the bleeding seemed to have come from the site of the first ligature, which was applied close to the sac, and which was still retained ; and there was some suspicion of the sac itself having been wounded ; the second ligature was detached, but no clot was observed in either side within the vessel.   (For further details, see page 107.)

In Case 83 the patient had extensive arterial disease; suppuration occurred at the seat of operation, hæmorrhage took place on the twenty-eighth day, and death on the twenty-ninth.

In Case 85 everything was proceeding satisfactorily ; the liga-

ture came away on the twentieth day, and he was considered convalescent, when he had an attack of pneumonia, and on the twenty-sixth day hæmorrhage took place, which was checked, but recurred at intervals afterwards, and he died on the thirty-fifth day from hæmorrhage from the wound.

In Case 75 the patient lived sixty-five days, after attacks of pyæmia, suppurating sac, and secondary abscesses. He had hæmorrhage from the wound on the forty-sixth day, although the ligature on the artery had come away on the twentieth day; the hæmorrhage occurred again on the fifty-second and sixty-fourth days, and death resulted therefrom on the sixty-fifth day.

In all the above cases there was more or less extensive disease of the arteries, and consequently want of repair after ligature, for there was absence of adhesion or clot-plugging, and in some there was ulceration of the coats of the vessel.

There are thus only five cases out of the whole number of twenty-one cases of ligature of the third or second portion of the subclavian artery for subclavio-axillary aneurism in which the application of the ligature was the actual cause of death.

In two cases, 74 and 84, the ligature was still retained on the artery, hæmorrhage taking place on the ninth and eighth days respectively; in both of these there was ulceration of the coats of the artery at its side; in one, 74, both sides of the artery contained grumous, fœtid, fluid blood, and it was on the cardiac or proximate side that the artery had given way. In the other case, 84, it was the distal side of the artery which permitted the escape of blood, and this was facilitated by the opening of the internal mammary artery close upon the ligature, thus preventing any clot-plugging; but on the cardiac or proximate side there was a strong, firm, adherent coagulum.

In two cases, 83 and 85, the ligature had come away. In case 85 on the twentieth day, and hæmorrhage did not set in until the twenty-sixth day, and proved fatal on the thirty-fifth day; and on examination it was found that the distal end of the artery had two ulcerated openings about two lines from where the ligature had been applied, and that the proximal end contained no clot, so that in all probability the blood came from both ends.

In Case 83 the date of separation of the ligature is not stated, but hæmorrhage occurred on the twenty-eighth day and death

on the twenty-ninth, when it was found that both ends of the artery lay in a large pyæmic cavity, and were quite patulous, and containing no clot.

Of one case, 81, there are no particulars.

In investigating the cause of death after ligature of vessels it is essential that accurate details should be collected respecting the condition of the plug or coagulum on either side of the ligatured vessel; the state of the coats of the artery itself, as well as of the arterial system generally; and the distance at which the collateral branches pass off.

General remarks on ligature of the second or third portion of the subclavian artery.

1st. *Respecting the success or fatality of the operation,* as far as the published statistics are concerned, we cannot arrive at any satisfactory conclusion. Up to the present time the deductions have been based upon all kinds of cases for which the operation has been performed—wounds of arteries, traumatic and idiopathic aneurisms, hæmorrhages, arrest of the process of new growths, &c. ; and again, the statistics include deaths which were not in anywise due to the operation itself, such as cases in which the ligature was resorted to when the patient was dying, and cases where death was due to accidental causes, or to gross carelessness in the operation, quite unconnected with the effects of ligature of the vessel. Hence the statistical tables of Norris, Porter, and others, are not strictly fair as to the results of the operation.

We have, however, thought fit to append the tables of the several collections.

Norris's collection of 69 cases of ligature of third portion of the subclavian for various causes gives 36 recoveries, 52·17 per cent. ; 33 deaths, 47·82 per cent.

Porta's collection, published about the same time, gives 74 cases of ligature of the third portion of the subclavian. 47 recoveries, 63·5 per cent.; 27 deaths, 36·48 per cent.

Holmes,[1] in his remarks on these collections, observes that probably Porta had missed 6 out of the 33 fatal cases of Norris's tables.

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[1] 'System of Surgery,' 2nd edit., vol. iii, p. 561.

Koch's collection comprises all cases of ligature of the third portion of the artery which had been recorded up to the year 1868. It embraces 185 cases. 82 recoveries, 44·32 per cent.; 100 deaths, 54·05 per cent.; in 3 result not stated. But he very fairly makes an objection to this deduction—which may likewise apply to the other collections,—viz. that it includes deaths which could not reasonably be attributed to the ligature of the artery. He has discussed this matter very fully in his monograph on the subclavian artery, to which we must refer our readers, as we have not space to enter upon this elaborate subject. However, after making all legitimate deductions, he finds the mortality to be about a little over 43 per cent.

Le Fort's collection is much more to the point. It includes 97 cases of ligature of the third portion of subclavian artery for wounds, or for diffused and circumscribed aneurisms of the axillary artery. 60 recoveries, 61·85 per cent.; 34 deaths, 35·05 per cent.; in 2 result not stated; 1 required amputation of the shoulder-joint.

Le Fort's collection, modified by excluding wounds of the artery, yields the following results :

	Recoveries.		Per cent.	Deaths.		Per cent.
9 diffused.	3	...	33·33	... 5	...	55·55; 1 followed by amputation.
71 circumscribed.	45	...	63·38	... 24	...	33·8; 2 not stated.
80 cases.	48		60·	29		36·25; 3 not included.

My collection excludes axillary aneurisms proper, and is confined to the subclavian and subclavio-axillary aneurisms. 21 cases : 9 recoveries, 42·85 per cent.; 12 deaths, 57·14 per cent.

Koch's collection, altered so as to embrace subclavian and axillary aneurisms. 65 cases : 36 recoveries, 55·38 per cent.; 29 deaths, 44·61 per cent.

From the foregoing statistics it appears that the average ratio of mortality varies from 40 to 50 per cent.

The high ratio of my own (Poland's) collection, viz. 57·14 per cent., has been fully and duly commented upon at page 115.

2ndly. *On the operation itself and its mode of performance.* —This we cannot enter upon, for it is a subject fully detailed in all surgical and anatomical works. But there are some difficulties which arise during the operation which the practical surgeon will do well to bear in mind. Most of these accidents

are alluded to in our summary after the recoveries and deaths, and require no further comment, otherwise than stating that in other instances of ligature of the artery the subclavian vein has been ligated, as also a trunk of the brachial plexus, with fatal results. The phrenic nerve has been injured; the pleura bruised and wounded; air has entered into the subclavian and external jugular veins; and there has been adhesion of the subclavian artery to the vein.

3rdly. *Respecting the immediate effects of ligature* of the third portion of the subclavian artery.—There is first observed an arrest of the circulation through the main trunks, which is soon followed by temporary rise in temperature of the limb, accompanied with numbness and tingling of the fingers and a slight deficiency of the muscular power; these remain for a more or less definite period. Then the natural heat of the part returns, the radial pulse resumes its beating, the ligature separates from the artery, and the wound cicatrises. Richet gives the following concise account of the phenomena:

"The skin at first becomes pale and cooled, and the arteries cease to beat; but soon the blood finds a passage through the collaterals, and then only does the skin become coloured anew, taking on a more animated tint, is reddened, and acquires a degree of heat which it had not before the ligature. This augmentation of colour and heat is due to the same cause, viz. the dilatation of the cutaneous capillary vessels; and with regard to this dilatation, it is, according to Claude Bernard and Martin-Magron, to be attributed to paralysis of these vessels, resulting from the strangulation of the sympathetic filaments which accompany the ligatured vessels. This, however, is not definitely admitted. After several days or even a few hours one may be able to detect with the sphygmograph a return of slight pulsation in the tumour and in the vessels; and in the case of a young girl, who had the subclavian artery severed by a knife, and in whom the arteries of the arm had immediately ceased to beat, we could in less than forty-eight hours after the accident detect by means of this instrument the circulation through the radial and ulnar arteries. There was in this case rise of temperature in the limb succeeding upon coldness, and very marked hyperæsthesia, the latter probably due to lesion of one or more branches of the brachial plexus."

The re-establishment of the circulation is so rapid in the upper extremity that it is rare for gangrene to supervene.

Le Fort states that in seventy-four cases of ligature of the subclavian there were only two instances of gangrene, and that in 142 cases of ligature of the main trunk of the upper extremity, from the origin of the subclavian artery to the bifurcation of the brachial, there were seven cases of gangrene. Norris gives six cases in sixty-nine aneurisms.

We have added a table of the twenty-one cases of our collection, showing the temperature of the limb, return of the radial pulse, and date of separation of the ligature, but it is very imperfect.

This table is inserted here, as showing the condition of the circulation observed in the limb after ligature of the third or second portion of the subclavian artery (see next page).

Koch has endeavoured to ascertain these points, and the following are the results of his investigation:

Temperature of limb after ligature, observed in twenty-three cases only:

(*a*) *Remained equal* on both sides in six cases. In three of these there was no variation during the progress of the case; in one temperature rose higher on second day; in one temperature became lowered on third day.

(*b*) *Diminished more or less* in fourteen cases. In one after three hours, in one in evening, in two on the first day, in three on the second day, in the remainder time not stated.

(*c*) *Increased temperature* in three cases, and in all soon after the operation.

Return of radial pulse observed in thirty-three cases:

In 2½ hours, or by evening of operation	. . . . 4 cases	On 11th day	. . .	1 case
In 60 hours .	. . . 1 case	„ 15th „	. . .	1 „
On 1st day .	. . . 8 cases	„ 16th „	. . .	1 „
„ 2nd „ .	. . . 1 case	„ 17th „	. . .	1 „
„ 3rd „ .	. . . 1 „	„ 21st „	. . .	1 „
„ 4th „ .	. . . 6 cases	„ 30th „	. . .	2 cases
„ 5th „ .	. . . 2 „	„ 36th „	. . .	1 case
„ 6th „ .	. . . 1 case	„ 45th „	. . .	1 „
„ 9th „ .	. . . 1 „	„ 50th „	. . .	1 „
„ 10th „ .	. . . 2 cases	After 6 months	. . .	1 „

No. of case.	Temperature of limb.	Return of radial pulse.	Date of separation of ligature.	Result.
68	Equal to that on the other side, but it diminished on the third day	None; rapid gangrene from fingers upwards	Firmly fixed at death	Death, 5th day.
69	Warm, but benumbed	Not stated	Firmly fixed at death	Death, 4th day.
70	Both sides equal in temperature on 2nd day; on 6th day feet and legs blue	No return of pulse; arm became blanched	Firmly fixed at death	Death, 7th day.
71	Not stated	Not stated	Firmly fixed at death	Death, 3rd day.
72	Somewhat increased after the operation	Return on 51st day	Came away on 47th day	Recovery.
73	Nearly equal to the other	Doubts as to its return, and then only feebly	Found loose in wound after death	Death, 15th day.
74	No diminution of temperature	Not stated	Ulceration at seat of ligature not separated	Death, 12th day.
75	Not stated	Not stated	Came away on 20th day	Death, 65th day.
76	Not stated	Return on 13th day	Came away on 20th day	Recovery.
77	Not stated	Not stated	Not stated	Recovery.
78	Never exceeded natural standard	Slight return directly after the operation	Two ligatures applied; one became loose, the other remained fixed	Death, 14th day.
79	At first cold after operation, but soon became natural	Returned feebly on 2nd day, and fully established soon after	96th day	Recovery.
80	Not stated	Not stated	21st day	Recovery.
81	Not stated	Not stated	Not stated	Death.
82	Not stated	Not stated	Came away on 13th day	Recovery.
83	No difference whatever	Questionable until 14th day	Came away, date not stated	Death, 29th day.
84	Natural	Not stated	Ligature stretched, but still retained	Death, 8th day.
85	Natural	Not stated	Came away on 20th day	Death, 35th day.
86	Equal to opposite side; 98°	Return on 17th day	Came away on 16th day	Recovery.
87	No perceptible difference	Indistinct thrill on 10th day	Came away on 17th day	Recovery.
88	No perceptible difference	Indistinctly felt on 12th day	Came away on 23rd day	Recovery.

Date at which the ligature separated, mentioned in sixty-five cases:

5th day .	. 1 case, cure		21st day .	. 3 cases; 2 cures, 1 died		
7th „ .	. 2 cases; 1 cure, 1 died		22nd „ .	. 2 „ 1 cure		
9th „ .	. 1 case, died		23rd „ .	. 2 „		
11th „ .	. 6 cases; 5 cures, 1 died		27th „ .	. 1 case		
12th „ .	. 6 „ 6 cures		28th „ .	. 1 „		
13th „ .	. 3 „ 2 „ 1 „		29th „ .	. 1 „		
14th „ .	. 3 „ 3 „		31st „ .	. 2 cases		
15th „ .	. 4 „ 4 „		43rd „ .	. 1 case	All cures.	
16th „ .	. 5 „ 4 „ 1 „		47th „ .	. 1 „		
17th „ .	. 7 „ 6 „ 1 „		52nd „ .	. 1 „		
18th „ .	. 4 „ 3 „ 1 „		85th „ .	. 1 „		
19th „ .	. 9 „ 2 „		96th „ .	. 1 „		
20th „ .	. 5 „ 3 „ 2 „		From the 11th to the 18th day, 38 cases.			

4. *Respecting the consecutive effects of ligature of the third portion of the subclavian.*

(*a*) *Inflammation and suppuration of the tissues* in the neighbourhood of the ligature, independently of the sac, occurred in four of my collection. One recovery and three deaths followed, and are duly mentioned in the review of these cases— 70, 83, 84, and 86.

(*b*) *Chronic phlebitis,* with recovery in one case, 72.

(*c*) *Pyæmia,* ending fatally in Cases 70, 75, 84. Koch gives eleven cases of death from this cause.

(*d*) *Pleurisy and pneumonia,* &c., in Cases 73, 84, both fatal. Koch records five cases of death from pleurisy and pneumonia, and two cases from pneumothorax. Norris gives five cases in sixty-nine aneurisms.

(*e*) *Cerebral complication* in Cases 71 and 68, alluded to under their respective details.

(*f*) *Gangrene* was observed in Case 68, and was threatening in Case 70. This occurrence has been already just alluded to.

(*h*) *Defective nutrition, atrophy, and permanent weakness of the limb* may ensue, and be more or less prolonged ; the arm becomes thinner, colder, and weaker, with anæsthesia, &c., and hence the susceptibility to change of temperature and risk of gangrene. Liston and some others attribute this to the enlargement of the collaterals and pressure on the nerves among

which they ramify, but it is generally considered to be due to insufficiency of the circulation.

(*i*) *Inflammation and suppuration of the sac* may sometimes be the result of ligature of the artery, and is attributed to the close proximity of the ligature to the sac, whereby the necessary coagulum is but ill-formed and loose, acting as a foreign body, and setting up irritation, inflammation, and its consequences.

This occurrence took place in Cases 80, 87, and 75. Two recovered, and one succumbed to the effects of pyæmia and secondary hæmorrhage from the sac. The perusal of the details of these cases furnishes all the necessary information required on this point, and the two recoveries afford ample evidence of the reparative powers when such an unfortunate occurrence takes place.

Le Fort, on ligature in circumscribed axillary aneurisms, states that inflammation and suppuration of sac was noticed in sixteen cases, but the details are incomplete. In some the suppuration occurred after a cure was effected; but it may set in immediately, or some days after the ligature—generally from the fifteenth to the twentieth day.

An inflamed and suppurating sac may burst spontaneously, this having occurred on the sixteenth, eighteenth, nineteenth, twenty-fifth, thirtieth, and fortieth day. Sometimes this giving way may be tardy, and not until two months afterwards.

It may be accompanied with hæmorrhage, but this is exceptional, as in the sixteen cases it was only four times mentioned.

Of the sixteen cases, five only were followed by death.

Norris gives five deaths from sloughing and suppuration of the aneurism out of sixty-nine cases.

Koch records twenty-five cases out of ninety-four aneurisms, thirteen recoveries and twelve deaths; eleven had hæmorrhage in consequence, of whom seven died; five suffered from great exhaustion, and of these three died; once the suppurating sac burst into the pleura, and was fatal; and once the sac burst into the shoulder-joint, and death ensued from pericarditis.

Seven cases had the general symptoms of suppuration without any special disturbance, making a gradual but protracted convalescence.

(*k*) *Hæmorrhage after ligature of the third portion of the*

subclavian.—We have so fully entered upon this point elsewhere that little needs to be added upon this subject, excepting the views obtained from the other collections, which comprise a vastly greater source for our guidance on this most important matter. However, in many cases the source of the hæmorrhage is not accurately defined.

Le Fort says, " Hæmorrhage consecutive to ligature of the third portion of the subclavian may occur from the sac after its rupture, or from the wound made for applying the ligature. In seventy-four cases of ligature of the subclavian there were fifteen cases of hæmorrhage, either from the ligated artery or the sac ; but in one case it supervened on the fourth day from the jugular vein, and recovery took place. In ten cases death supervened ; in one the hæmorrhage was combated by amputation' at the shoulder-joint, and in three only was the hæmorrhage able to be arrested by compression. The date of the supervention of hæmorrhage from the seat of ligature is mentioned in ten cases :—Two on the eighth day, two on the twelfth day, three on the thirteenth day, two on the fourteenth day, one on the seventeenth day."

" There were seven deaths from hæmorrhage from the seat of ligature, occurring before the fourteenth day."

He attributed the rapid deaths to the inefficiency of obliteration of the cardiac end of the artery, for in two cases there was notable occlusion of the peripheral end of the vessel, but absence of clot in the cardiac end.

Hæmorrhage from the seat of ligature generally takes place at the time of separation of the ligature, and is, therefore, to be expected from the eleventh to the twenty-first day, this being the most frequent period at which it is cast off.

Holmes observes that secondary hæmorrhage is more common in the upper extremity, where the heart is near, the circulation powerful, and the processes more rapid than in the lower extremity. It is more to be apprehended after ligature for aneurism, when the artery is more likely to be diseased at the point operated on.

We may thus sum up the points respecting hæmorrhage after ligature of the third portion of the subclavian artery :

(*a*) *From the sac,* either *primary* from puncture in operation,

or *secondary* from ulceration or rupture, at an early period, or later after inflammation and suppuration and giving way of the sac.

(*b*) *From the ligatured part*, in consequence of non-obliteration of the artery, when the ligature is becoming detached, the hæmorrhage being generally from the peripheral end of the artery tied.

It may be due also to an unsound state of the coats of the vessel, such as dilated thinned coats or atheromatous degeneration.

Hæmorrhage when occurring before separation of ligature is generally due to ulceration of the coats close to the ligature, either on the distal or cardiac side, and may be caused by the forcible stretching of the ligature, or by feeble and diseased walls giving way under the pressure of a fuller force of blood-current, and where there has been no repair by fibrinous and adhesive plugs.

Hæmorrhage after separation of ligature is generally from the distal end, and due to the proximity of branches coming off, and too quick a return of the collateral circulation, generally preceded by a return of pulsation in the tumour.

Failure of formation of clot and fibrinous plug may in a measure arise from deficiency in quality and plastic character of the lymph ; or this may be in too small quantity or else incapable of becoming organized, as pointed out by Holmes.

Respecting the true source of the hæmorrhage we have endeavoured to arrive at a right conclusion in the cases of our collection, and endeavoured to ascertain the condition of the plug on either side of the ligature (see page 117).

In perusing Koch's cases we find only fifteen instances in which this point has been accurately investigated after death ; in two the hæmorrhage came from both ends of the vessel, in two from the cardiac end, and in eleven from the peripheral end.

In our cases the hæmorrhage came from both ends in two instances, in a third from the cardiac end, and in a fourth from the peripheral end (see page 117).

Hæmorrhage from the seat of ligature does not always prove fatal, as may be seen in Case 80, where it took place on the sixteenth day to the amount of two pints and was arrested by

pressure, the ligature not coming away until the twenty-first day. Koch in his collection gives several cases of recovery.

CASE 196. *Pirogoff.*—Ligature came away on seventeenth day, followed by hæmorrhage, which was successfully controlled by styptic powder, pressure with balls of charpie, and the application of ice.

CASE 44. *Thorpe.*—Hæmorrhage on twelfth day to thirty ounces. Spontaneous arrest by fainting; ligature came away on fourteenth day, and no recurrence. ('Amer. Journ. Med. Sci.,' 1828, vol. ii, p. 216.)

CASE 62. *Fergusson.*—Ligature came away on thirty-second day with a portion of the artery; hæmorrhage on the thirty-fifth day, checked by pressure and recurrent; recovery. (See case below.)

CASE 91. *Green.*—Hæmorrhage on twelfth day to the amount of a pint and in a jet. Pressure and cold every ten minutes with effect. Ligature came away on twenty-seventh day. Recurrent hæmorrhage on the ninetieth day in arterial jets, and recurred on two successive days, but was readily restrained by pressure. Return of the radial pulse on the 132nd day ('Chelius's Surgery,' by South, vol. ii, p. 224).

We may be pardoned for introducing the following notes of a remarkably successful issue of a case of ligatured subclavian artery in its external third for an axillary aneurism in a man, æt. 60, under the care of Sir William Fergusson, in the year 1831, and recorded in the 'Edinburgh Medical and Surgical Journal,' vol. xxxvi, for 1831, p. 309, where a large portion of the subclavian artery came away with the ligature.

June 13th.—The ligature came away on the thirty-second day after a smart tug, and a portion of the artery half an inch long, and about half its circumference, came along with it. I have no doubt, from the direction in which it came as I pulled t out, that it had been nearer the heart than the ligature, and from its length it must have come off near to the large artery. When the ligature was removed it appeared that that part of it which lay in the wound was two inches and a half long, showing how deep the vessel must have been before the operation. No blood followed the removal of the ligature, and the portion of the artery which came along with it must have been separated from the other parts for many days, as it was quite putrid and had a very offensive smell. June 16th, a little blood was observed to ooze from the wound, but it soon stopped. I was sent for at 7 a.m. on the 17th, in consequence of the bleeding having recurred, but found it had ceased before I arrived, about half an ounce in quantity having been lost. The patient said it spouted past his ear with considerable force, but it was stopped by his wife placing her finger on the orifice of the wound, which was now not larger than that made by a lancet. During the day I kept several assistants sitting by him in case the bleeding should return, but fortunately it did not.

Inflammation and suppuration of the sac ensued, requiring laying open. The man recovered rapidly.

The history of this patient since his return home is the following :

He gradually returned to his old habits, and led a careless life. In the severe part of the winter, 1835, nearly four years after the operation, he was found dead a little off the road side one morning in February, and no doubt could be entertained that he had perished of cold whilst sleeping away the effects of intoxication in the open air at this inclement season. There was no trace of axillary tumour to be perceived, and only the marks of the cicatrix. There were two large vessels in the ordinary situation of the supra-scapular and transversalis colli arteries; on the surface of the first rib a branch of considerable size passing outwards and slightly upwards and backwards, probably the deep cervical arising from the subclavian artery behind the scalenus; below this branch the artery was found flattened, with its opposed serous surfaces in a state of adhesion to each other; two inches further down the remains of the artery were lost in a hardened mass, which on being unravelled a little presented the axillary plexus of nerves. Opposite the upper margin of the latissimus dorsi a knuckle-like projection appeared, which was the artery larger than its natural diameter, filled with a dense clot of fibrine; and a little further down, the vessel assumed its usual size, and where it becomes the humeral was quite pervious and of a natural appearance. A vessel of the magnitude of the subscapular was attached to the agglutinated mass, a little higher than the projection described, and in this situation it was filled with fibrine, but lower down it was quite patent and had a branch of considerable size running into it, also patent. Several large veins were found in front of those parts, but none corresponding or bearing any resemblance to the subclavian, which I therefore concluded was obliterated.

Heart and lungs healthy. Aorta somewhat dilated, its inner and middle tunics slightly thickened; in laying it open a patch of calcareous matter might be here and there observed, as was also the case with the innominata.

The preparation shows that an internal coagulum is not essential to the permanent closure of an artery on which a ligature has been placed, and that there is less danger than has been imagined in placing a thread near to any large branch which may be given off from the artery between the seat of ligature and the heart.

A few words with regard to *ligature between the scaleni muscles,* so strongly insisted upon by Koch, who gives a separate paragraph for this class of cases. He has enumerated twelve cases, of which seven recovered and five died; nine were aneurisms, and three were due to various other causes. Of these nine aneurisms three have been already referred to in my own collection, Cases 71, 76, and 80, as also another one which has been erroneously placed here by Koch, but which was truly a case of ligature of the third portion (see Case 79, that of J. M. Warren); thus leaving five cases only for consideration, viz. *Dupuytren's* case of axillary aneurism, where the scalenus was divided, a ligature applied, and recovery ensued; *Liston's* case of axillary aneurism, described in vol. xvi of the ' Edinb. Med. and Surg. Journal,' and

which recovered; *J. C. Warren's* case of axillary aneurism, also successful; *Langenbeck's* case of diffused subclavio-axillary aneurism, with death on ninth day from pyæmia; and *Pitha's* case of diffused axillary aneurism, where death ensued from pneumonia on the sixth day. Thus, in the eight cases we have five recoveries, four of aneurism on the left side and one on the right. Three deaths: one of aneurism on the left side from coma, sixty-eight hours after the operation; two on the right side, from pyæmia.

These cases, moreover, fully prove that the artery may be here ligated without injury to the phrenic nerve or want of plug formation in the vessel at the seat of ligature. It is singular also that in four out of the five recoveries the disease was on the left side. We must also remember that in the majority the scalenus muscle was only partially divided, its division being merely an extension of the operation for the outer third of the artery. We cannot pass over this important subject without quoting the very terse observations of *Porter* on ligature of the left subclavian between the scaleni muscles, although these remarks are not quite fully borne out by the cases above alluded to; he says:

"There are but two situations in which the subclavian artery on the left side can be taken up before it reaches the first rib, namely, whilst it is yet between the scaleni muscles and after it has passed the outer edge of the anterior scalenus. The former of these operations has been (as far as I know) only performed by Dupuytren, in a case detailed by Marx in the second number of the ' Répertoire Générale d'Anatomie,' and the advantages attendant on the choice of this situation are stated to be, first, the facility of cutting down on and exposing the artery here; second, the impossibility of interfering with or injuring the great subclavian vein; third, the great nerves being thus placed in a comparative state of safety. But Marx makes no mention whatever of the phrenic nerve, which is always so placed in front of the scalenus that it could only be avoided by careful and protracted division of the muscle; and, again, no mention is made of the thoracic duct, which, lying just at the internal edge of the muscle, must have been fearfully endangered. In his case there is every reason to believe that neither of these very important parts were injured, as the case progressed without an untoward symptom, and the patient recovered. Yet, as the mere knowledge of the existence of such difficulties must add to the embarrassment of the operator, and their avoidance cause both trouble and delay, they furnish very good grounds for selecting any other possible situation in which the artery may be secured. Add to these that generally there are three large branches given off by the subclavian whilst it is between the scaleni muscles, it is difficult to find space sufficient to permit a needle being turned round the trunk without injuring one or the other

of them, and that the first dorsal nerve, from its situation behind the artery, would be extremely liable to be included within the ligature. This situation should never be chosen unless the aneurismal tumour be so placed as to prevent the exposure of the vessel after it has passed the scaleni, where it has hitherto been so frequently tied with success."

In concluding our remarks on ligature of the third portion of the subclavian artery we cannot do otherwise than quote the very able observations of Holmes on this operation (see ' System of Surgery,' 2nd edition, vol. iii, p. 558), recollecting, however, at the same time that we have recorded nine successful cases performed under circumstances which may warrant the adoption of the operation in future cases (see pp. 75 *et seq.*, with the comments attached).

"That the ligature of the subclavian artery should be a very fatal operation when performed for axillary aneurism will surprise no one who considers the condition under which it is performed. In the first place, it resembles Anel's operation almost as much as Hunter's. Hence *suppuration* of the sac from loose formation of clot and *secondary hæmorrhage* from disease of the artery may be anticipated. Again, the ligature must be placed in the immediate vicinity of large branches. Then, again, the deficient formation of laminated clot is further favoured by the absence of a loose structure of the aneurismal sac, and by want of resistance in the parts which surround it. For these reasons the sound cure of the disease is less probable and suppuration in the sac far more common in axillary than in other aneurisms ; and if to these sources of danger those above noticed, which result from the anatomy of the parts, be added, we shall have, I think, a satisfactory explanation of the high mortality of the operation."

This statistical Report on Subclavian Aneurism will be concluded in the next volume.

ON

RETRO - PERITONEAL HERNIA.

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By P. H. PYE-SMITH, B.A., M.D.

SOME years ago I noticed in the University Museum at Prague a dry preparation of a form of internal hernia which I have not seen described in English works on the subject. It had been put up and described by Professor Treitz; and following the indications given in his pamphlet on the subject,[1] I have since verified his account of the anatomical arrangements which lead to this class of intestinal obstructions, and have come across two cases of internal hernia corresponding with his description.

It will be remembered that as the inferior mesenteric artery comes off from the aorta it is directed downwards and to the left, crossing obliquely the vein of the same name, which runs upwards and inwards, in a posterior plane, to join the superior mesenteric and splenic veins. Hence these two inferior mesen- teric vessels, with the left colic branch of the artery and abdominal aorta, enclose a more or less oval space to the left of the lumbar spine, very plainly seen when the arteries are injected and the portal system full.

This is just the place where the transverse part of the duodenum comes forward from its position across the spine, and ends by making the first free convolution of the small intestine—the duodeno-jejunal flexure. The peritoneum, which before bound the gut tightly down to the back of the abdomen, is now suddenly stretched, as it were, to form the upper part of the mesentery, and here there is very frequently to be found a semilunar fold or edge of peritoneum with its concavity looking

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[1] 'Hernia retroperitonealis: ein Beitrag zur Geschichte innerer Hernien, von Dr. W. Treitz, Professor der pathologischen Anatomie in Prag.' Credner, 1857.

upwards and inwards (*i.e.* to the right). This fold is continuous on its inner side with the peritoneum covering the transverse duodenum, and forming the inferior layer of the transverse mesocolon, below with that overspreading the inferior mesenteric and left colic arteries (which run a little below the edge of the fold), and on the outer side with the descending mesocolon. The slight fossa which this fold makes may be of considerable depth, running down as a pouch of peritoneum behind the fold and the inferior mesenteric artery, with the aorta and spine to the right, the descending colon and kidney to the left, while its orifice of communication with the general peritoneal cavity corresponds with the more or less oval space above described, and its upper and outer edge covers the inferior mesenteric vein.

The relation of the parts can readily be seen in any subject where adhesions have not occurred, by throwing up the omentum and transverse colon, and drawing the whole of the jejunum and ileum over to the right. The space described is then at once recognised, and if there be no fossa nor even a distinct fold of peritoneum, it is easy to make one, by pushing the smooth parietal peritoneum covering the oval space downwards behind the inferior mesenteric artery.

During the last four years I have examined the subjects in our dissecting room, and have not found the fold and fossa just described as frequently as Professor Treitz has (38 per cent.). In a large number of cases, however, adhesions and contractions existed at the spot, so as to obscure the natural arrangement of the peritoneum, and a sufficient number of cases were found to confirm the accuracy of his account. In three instances, besides the case of hernia to be noticed afterwards, the fossa was large enough to receive the last joint of the middle finger; in the majority of cases without adhesions the fold was distinct, though the fossa was reduced to a mere depression behind it; and in several others the peritoneum passed quite smoothly from the duodenum to the colon without any puckering or even opacity. The facility, however, with which in these last cases the fold could be produced by gentle traction and pressure, or the extent of the fossa increased when it was already present, shows how loose the sub-peritoneal connective tissue is at this spot, and how easily a hernial protrusion might here occur. In dissecting a fœtus, I have seldom failed to find the fossa well

marked. So far as I am aware, this anatomical condition has not yet been noticed by any English anatomist.[1]

It is obvious that the first free convolution of the small intestine is very liable to pressure from within, and a frequent effect of this pressure would be to produce, or to increase if already present, the hollow above described, so as at last to form a hernial protrusion of the duodeno-jejunal flexure backwards and downwards, the sac being formed by the fossa above described, and its neck bounded by the inferior mesenteric vein, the artery of the same name, and its colic branch.

A rupture of this kind may be described as " retro-peritoneal," because its sac lies behind the great cavity of the peritoneum, with which it is continuous at the neck. Its occurrence would appear to be rare, and was not recognised until Professor Treitz drew attention to it. He has put on record eight cases of his own —all found accidentally after death, and none strangulated or even incarcerated—besides a few more or less doubtful cases from previous authors. The only probable example I found in the 'Transactions of the Pathological Society' is the former of two cases of " mesocolic hernia," contributed by Dr. Peacock (vol. ii, p. 60). Our museum at Guy's contained no specimen of it, nor do those of St. Bartholomew's or St. George's Hospital. In St. Thomas's museum I found a dry preparation of a case of internal hernia, described and figured by Sir Astley Cooper in his work on ' Hernia.'[2] It was accidentally discovered in the body of a man æt. 55, who died in consequence of an amputation in Guy's Hospital.

" When the abdomen was opened for demonstration, and the

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[1] It was first, I believe, described by Huschke in 1844. In the last edition or Cruveilhier's 'Anatomy,' by MM. Sée and Cruveilhier fils (1865-68), there is no mention made of this "duodeno-jejunal fossa." The new edition of Henle's 'Anatomy' has not yet reached the section on the peritoneum. In Langer's ' Lehrbuch der Anatomie' (Vienna, 1865) the fossa is described (p. 641) under the name "bursa duodeno-jejunalis," and stated to be constant, but the lower edge of the opening is said to be bounded by the *superior* mesenteric artery and one of its branches: a blunder which, oddly enough, also appears in the short account of my own specimen in the ' Pathological Transactions' for 1867. Professor Wenzel Gruber ('Virchow's Archiv,' xliv, 215) names the fossa " Retroeversio (!) mesogastrica s. media s. intermesocolica."

[2] 'Part ii,' p. 73, pl. xv. The number of the preparation in the museum is R 18.

omentum and colon were raised, the small intestines did not appear, but in their stead, in the middle of the abdomen, was found a tumour situated on the lumbar vertebræ, and extending down to the basis of the sacrum. . . . The beginning of the jejunum was found passing into the sac at the posterior part, and by the same opening the ileum passed out . . . and entered the large intestines in the usual manner." There was no appearance of inflammation or adhesion.

Sir Astley Cooper describes the case as one of " mesenteric " hernia, and supposes that the intestine had passed through an accidental or congenital opening between the two layers of the mesentery. From the description and the plate, however, I think it more than probable that this was really a case of retro-peritoneal hernia; and if so, it accords remarkably with the one again accidentally found in a body opened for dissection here about fifty years afterwards.

A second case, described by Sir Astley Cooper as mesocolic hernia,[1] has been included in his list of cases of the duodeno-jejunal variety of retro-peritoneal hernia by Professor Treitz, but there can, I think, be no doubt, from the anatomical relations shown in the plate, that this was not its true nature, for the descending colon and its arteries are pushed *behind* the hernial sac. It may possibly have been a case of " intersigmoid" hernia.

Dr. Chiene described a case, under the title of " intra-peritoneal hernia," in the ' Journal of Anatomy and Physiology' for May, 1868, which, from the careful anatomical description and diagrams, will be at once recognised as a good instance of the form of rupture I am describing.

In the last edition of Rokitansky's great work (1861) the description given by Dr. Treitz is adopted, without reference to any fresh cases.[2] Förster, in like manner,[3] only refers to the account of the same author. He describes mesocolic hernia as consisting in a piece of gut passing between the two layers of the mesocolon after rupturing one (op. cit., p. 110). In an elaborate paper in vol. xliv of ' Virchow's Archiv' Prof. Wenzel Gruber, of St. Petersburgh, collects more than thirty cases

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[1] Op. cit., part ii, p. 74.

[2] ' Lehrbuch der pathologischen Anatomie,' 3 Auflage, iii Band, Wien, 1861, s. 136. Dr. Treitz's pamphlet is quoted as an " Ausgezeichnete Arbeit."

[3] ' Handbuch der pathologischen Anatomie,' Bd. ii, S. 105.

which, he thinks, may be regarded as instances of Treitz's retro-peritoneal hernia, which he prefers to call mesogastric, but only a few of these can be accepted as undoubtedly of that nature. One of the best described is one by Dr. Klob, quoted from the 'Zeitschrift der k. k. Ges. d. Aerzte in Wien' for 1861.

A remarkable case of internal strangulation was described by Dr. Ridge, in a paper read before the Hunterian Society in January, 1854. The patient was a boy of 14, and when seen by Dr. Ridge, five days after symptoms of obstruction with abdominal pain and vomiting had set in, he was already in a state of collapse. The abdomen below the navel was depressed, hollow, and dull on percussion, but a little to the left and above that point (immediately over the oval sac above described) there was a slight prominence, which was resonant. The vomited matters were not fæcal; the urine was very scanty. From these symptoms Dr. Ridge diagnosed complete obstruction of part of the jejunum from some mechanical cause external to the bowel itself. Mr. Hilton was then sent for, and after consultation he opened the abdomen by a vertical incision over the above-mentioned swelling. The transverse colon and great omentum were at once recognised. An opening, apparently in the mesentery, was recognised by the operator's finger *at the point where the jejunum becomes comparatively free from the spine,*[1] and through this was drawn a coil of intestine, six to eight inches long, distended and congested, but not yet gangrenous. Immediate relief followed the operation, and liquid nourishment was given and retained; but symptoms of exhaustion supervened, and the patient died at about ten o'clock the same evening. There was no post-mortem inspection. Most anatomists will probably agree with Professor Treitz, that this remarkable case was most likely one of retro-peritoneal hernia, and that the opening felt by Mr. Hilton was not an accidental perforation of the mesentery, but the mouth of a sac formed in the way above described.[2]

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[1] See Mr. Hilton's account, p. 19 of Dr. Ridge's pamphlet.

[2] After referring to this case, Dr. Treitz adds, " I cannot but remark on the great honour due to my English professional brethren for the precision of their diagnosis, as well as their confidence in their diagnosis and courage in carrying out the operation. Unfortunately their admirable treatment was not crowned by the success it so well deserved, a result which is sufficiently explained by the peritonitis and exhaustion which had set in before their advice was sought."

I found a large hernia answering to all the characters of this retro-peritoneal variety in one of the bodies dissected here three years ago. The large intestine occupied its normal position, but the first three feet of the jejunum were contained in a large sac which occupied the centre of the abdomen, and formed a smooth, almost globular tumour, covered by the posterior parietal peritoneum. The bowel entered and returned from this sac through a large opening, situated to the left of the spine, between it and the descending colon, and bounded by the inferior mesenteric artery and its left colic branch. The whole of the intestine could be easily drawn out of its sac, and showed no sign of inflammation or even of pressure. The receptacle was no hole in the serous membrane, but a true hernial sac lined continuously by peritoneum. I made inquiries at the workhouse where the old woman had died, but was unable to get any information as to her previous illness. It was, however, pretty evident that there had been no obstruction, and the bowel had certainly not been strangulated. The parts concerned in this case were exhibited at the Pathological Society,[1] and are now preserved in our museum.[2]

In this case, as in some others of the few as yet on record, the hernia had probably been very gradually produced, and had long existed without causing any symptoms, except, perhaps, occasional constipation. But in other instances the neck of the sac has undoubtedly pressed upon the coil of intestine within, and produced all the symptoms of strangulation. The vein and artery, which form the chief part of the neck of the sac, would probably be in themselves more yielding before gradual pressure than the fibrous tissue beneath the peritoneum at the seat of stricture in femoral hernia, where the greatest amount of expansion takes place externally towards the crural vein.

From a consideration of the anatomical conditions above detailed, we may, perhaps, infer the following points of diagnosis of such a form of hernia when strangulated.

The attack would probably, as in Dr. Ridge's case, be sudden and severe, with complete obstruction of the bowels and severe umbilical pain, but without peristaltic movements visible through the integuments, and without hæmorrhage. So far the symptoms would agree with those of internal strangulation

[1] 'Trans.,' 1867, p. 108.   [2] No. 2507³⁰.

generally. But apparently persons suffering from this form of internal rupture are liable to attacks of obstruction coming on from time to time and passing off spontaneously, so that, though the symptoms present occur suddenly, they may have been preceded by a similar attack at a former period. From the seat of obstruction being so high up, from the sudden and severe onset, or from the usually persistent vomiting, the secretion of urine would be very much diminished. From the whole of the large intestines and more or less of the ileum and jejunum being below the seat of obstruction, the lower parts of the belly and the flanks would be concave and resonant on percussion, and this has been observed after death. The epigastric and more or less of the umbilical regions, on the other hand, would be more prominent, dull on percussion, and tender, and in long-standing cases these characters might extend into the left lumbar region, indicating an extensive hernia. More commonly, however, the acute symptoms of strangulation would probably occur with a small rupture; and in either case the earliest and most marked seat of fulness and of tenderness will be over the seat of obstruction, namely, the neck of the duodeno-jejunal fossa. This spot is in the lower part of the epigastric region, somewhat to the left of the median line, two inches above and a little outside the umbilicus. Here lies the first coil of the jejunum, and immediately behind it the fossa. The point at which the inferior mesenteric artery comes off varies a little, but only enough to make the vertical diameter of the fossa somewhat less when it is higher, greater when it is lower. In the rare case of its rising before the renal artery [1] the opening of the pouch would be reduced to its smallest limits.

If, then, a fixed and tender swelling were found at the spot thus indicated, in a case of probable strangulation of the small intestine high up, and especially if similar attacks had preceded, we might form a tolerably safe diagnosis of this form of internal hernia.

Beyond placing the patient on the right side with the pelvis raised, so as to favour spontaneous reduction of the ruptured bowel by its own weight, the only special line of treatment

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[1] A case is recorded in the fourteenth volume of this series, p. 449.

apparently open would be by operation.[1] When the exact seat
of the obstruction is probably ascertained, and its cause is in
all likelihood a mechanical one, the propriety of surgical in-
terference will generally be admitted; and the success with
which Mr. Hilton relieved the strangulation when its peculiar
anatomical conditions had not yet been recognised furnishes
the best encouragement for a similar plan of treatment.

Another form of retro-peritoneal hernia has been described by
Dr. Treitz (and after him by Rokitansky) under the name
hernia intersigmoidea (H. hypogastrica sinistra of Gruber).
He has never seen a case himself, but describes it as consisting
in the enclosure of a coil of intestine in a sac formed in the
lower or internal layer of the sigmoid mesocolon. I have occa-
sionally met with small fossæ of the peritoneum at this spot,
but have generally believed them to be the result of adhesions,
and have never seen one large enough to contain a knuckle of
intestine. Moreover, on referring to the two cases supposed to
be on record, I find that Mr. Lawrence[2] merely mentioned the
process of peritoneum belonging to the sigmoid flexure among
other parts as the occasional or possible seat of internal hernia,
without giving any example; and I venture to think, after
carefully reading the history of De Haen's case,[3] and studying
the two figures illustrating it, that it was one of a small knuckle
of ileum (near its termination, as he expressly states), passing
through a rent in the ascending mesocolon between its hepatic
flexure and the cæcum.

Of the third variety of retro-peritoneal hernia, the sub-cæcal
(H. hypogastrica dextra of Gruber), Dr. Treitz quotes only
two cases, one reported by Wagner in 1833 and the other by
the late Dr. Snow.[4] It consists in the incarceration of a por-

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[1] In fact, such a case would exactly fulfil the conditions justifying an explora-
tory operation, as laid down by Dr. Fagge in his paper on "Intestinal Obstruc-
tion," in the ' Guy's Hospital Reports' for 1868, p. 309.

[2] ' Lawrence on Ruptures,' fifth edition, p. 630.

[3] " Hernia entero-mesocolica," ' Ratio Medendi,' pars xi, cap. 3, and tab. ii, fig.
1—3, Parisiis, 1769 (tom. vi, p. 103). This patient, a woman of 57, had her tem-
perature observed daily. De Haen thought 98° Fahr. high, and when it fell two
degrees lower he looked on it as a good sign. " Calor post modum hominis sani,
graduum 96 scilicet" (p. 109). He also notices that the temperature rose after
death from 92° to 96° Fahr., and fell again within the first hour.

[4] ' London Medical Gazette,' July 17th, 1846, p. 125, and also p. 1049.

tion of the ileum in the sac formed by the peritoneum passing from the front and inner side of the cæcum to the back wall of the abdomen, so that its mouth looks downwards and somewhat forwards and inwards (to the left). It is therefore nearly symmetrical in position on the right side of the abdomen, with an intersigmoid pouch on the left. The very frequent adhesions and cicatrices in this part of the peritoneum, and the great variation in the length of the process of serous membrane passing from the cæcum to the parietes, make the size and relations of the fossa behind the gut difficult to determine; but I have found three undoubted instances of its occurrence. Two of these were in children, and the sac or fossa easily allowed the ungual phalanx of the middle finger to pass up behind the cæcum. In these cases the fossa was empty; and so it was in Dr. Snow's case, where "the finger could be passed for two inches." There the strangulation which was present was caused, not by the subcæcal sac, but by the not infrequent occurrence of a band passing from the appendix vermiformis to the ileum and constricting the latter.

But in a case to which Dr. Moxon kindly called my attention a few months ago, I found several feet of the latter end of the ileum contained in a large and well-marked retroperitoneal subcæcal pouch. The person in whose body this hernia was discovered had exhibited no symptoms of intestinal obstruction during life, and the incarcerated coils of gut, which were easily removed, showed no trace of inflammation, congestion, or adhesion to the sac. The mesentery attached to the ruptured intestine was thick from subperitoneal fat, and formed a bulky folded border at the entrance to the sac. The preparation is now preserved in our museum (No. 2507[15]).

DESCRIPTION OF DIAGRAMMATIC FIGURE

Illustrating Dr. Pye-Smith's paper on Retro-peritoneal Hernia.

The transverse colon has been thrown up, and the lower part of the jejunum and all the ileum is supposed to be cut away to show the opening of the duodeno-jejunal or mesogastric pouch.

The double dotted line shows the course of the third part of the duodenum and the upper part of the jejunum, the former covered by the inferior layer of the transverse meso-colon (*m. c. t.*), the latter inclosed in the hernial sac.

I. j. is the lower portion of the jejunum after its emerging from the sac.

A. m. i. is the inferior mesenteric artery, forming, with its left colic branch (*A. c. s.*) and the inferior mesenteric vein *V. m. i.*), part of a circle around the neck of the sac. It will be seen that the bifurcation of the aorta is put much too low, and its inferior mesenteric branch is usually nearer to the edge of the sac than is represented in the diagram.

ON

LEFT-HANDEDNESS.

By P. H. PYE-SMITH, M.D.

THIS condition, as an occasional occurrence, appears to be common to all nations and to all times, as far back as history, tradition or language can lead.

The only explanation, so far as I know, which has been offered of the peculiarity is, that it depends on transposition of the viscera. This theory has been often proposed, and has received the sanction of no less an authority than Professor Hyrtl, of Vienna. It is supported by certain cases—one was published by Dr. Buchanan, of Glasgow—in which the two conditions coexisted. But a few such instances only prove that transposition of the viscera does not *prevent* the subject of the abnormality from being left-handed. Though attention has hitherto been little drawn to this point, there are enough cases already recorded to show that for a person with transposed viscera to be left-handed is a mere coincidence. M. Gachet[1] reports a case of transposition without left-handedness in a young woman, in whom the observation was made during life. Another was recorded by M. Géry,[2] a third by Dr. B. S. Schultze;[3] and in the case of transposition of all the viscera recorded in the fourteenth volume of these 'Reports' (p. 455) I ascertained that the subject of the abnormality had been right-handed during life. Indeed, by an examination of the chest in left-handed persons it may be readily seen that most of them at least have their hearts in the right place.

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[1] 'Gaz. des Hôp.,' Aug. 31, 1861.   [2] 'Cruveilhier's Anat.,' i, 64-5.
[3] 'Virchow's Archiv,' xxii, 209.

The explanation of transposition of the viscera, which was first advanced by Von Baer in 1828, and afterwards adopted by Förster, in his treatise on 'Malformations,' is that it depends on the yelk-sac lying to the right instead of, as usual, the left side of the embryo; and beside the original observation on which the theory was founded, it has been so far confirmed by cases in which the right-hand one of two embryos, with a single umbilical cord and vesicle between them, had transposed viscera. A case of this kind was recorded by Dr. Schultze, and I have found another in our own museum.[1] If this be so, such an early and complete anatomical change would be likely to produce more striking and constant changes of function than we see in a condition so variable in degree and extent as left-handedness.

To meet the case of left-handed persons with their viscera arranged in the usual way, it has been proposed, as a supplementary theory, that they may be the subjects of an abnormal origin of the primary branches of the aorta, and especially of that condition in which the right subclavian arises from the third part of the aortic arch. This is not an infrequent variety,[2] and as it cannot be recognised during life, its connection with left-handedness is not easy to investigate. But in one case at least, Dr. Peacock was so kind as to ascertain for me that the subject of this abnormality, whose heart and arteries he had examined for another purpose, was right-handed during life.

If, then, the cause of left-handedness is yet to seek, we should not, I think, begin by inquiring why a very few persons use their left hand rather than their right, but why the great majority use their right hand rather than their left.

And the question is not confined to the use of the hand, for we see the same preference for the other organs of the right side; while, again, there are persons who are left-eyed[3] and left-legged, as well as left-handed. If there be a physical cause for this preference we should, therefore, seek it rather in the

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[1] See postscript.

[2] In 296 bodies I found it four times.

[3] Some men, for instance, shoot with the left eye; but I have never known any one reverse the entire process and pull the trigger with the left hand, even when firing from the left shoulder.

central nervous system than in the arteries which supply the upper limbs.

Is, then, the brain perfectly alike on both sides? The slight differences in shape and direction of the right and left cerebral convolutions in man are probably the accidental result of their packing together during their growth, and have no more physiological importance than the convolutions of the small intestines, which are formed in the same way. But Gratiolet once made the statement that the anterior convolutions of the left side are earlier developed than those of the right, and this might be supposed to give earlier education to the muscles and nerves of the right side of the body. This statement, however, appears to be incorrect, for it has been contradicted by three independent observers—Ecker, Vogt, and Callender. But, according to Broca,[1] in forty brains the left frontal lobe was found to be, on the average, heavier than the right; and a similar assertion with respect to the weight of the entire left half of the cerebrum has been made on the basis of very numerous observations by Dr. Boyd.[2] That this difference does not depend on the supposed freer access of blood to the brain through the left than the right carotid seems clear; for even if the amount carried to each side be unequal, which appears very doubtful, the inequality only begins at a comparatively late period of development. At least, we must admit that the normal arrangement of the primary branches of the aorta in man is not the cause of difference in the actions of the two sides of the body, both from the actual cases mentioned at the beginning of this paper and from the common occurrence of the same arrangement among mammals in whom the two limbs are perfectly symmetrical in function.

Whether there be really the gross difference in bulk (or in specific gravity?) between the two halves of the brain or no, it appears more than probable that some constant difference exists. The association of loss of speech with lesions of the left side of the brain alone almost compels such a conclusion. And Dr. Brown-Séquard's recent experiments have led him to believe that—at least in guinea-pigs—the left half of the cerebro-spinal

[1] Quoted in an important article on "Aphasia" by Dr. Bateman, 'Journal of Mental Science,' Oct., 1869.

[2] 'Phil. Trans.,' 1861, p. 261.

centres has more to do with functions of animal life in general, the right with those of nutrition.[1]

The opinion that some difference between the two sides of the brain has to do with our preference for the right hand over the left may, perhaps, be supported by two very interesting cases of aphasia occurring in left-handed persons, recorded by Dr. Hughlings Jackson[2] and Dr. John Ogle.[3] In both these patients there was paralysis of the *left* side, so that it seems likely that in these two left-handed people the right half of the brain had the functions, if not the structure, which ordinarily belong to the left. To these cases may be added a very remarkable one published by Dr. Wadham.[4] An ambidextrous (or partially left-handed) lad was attacked with left hemiplegia and loss of speech; he had partly recovered at the time of his death, twelve months later, and then the right insula and adjacent parts were found softened.

But supposing it to be conclusively shown that there is a structural difference between the right and left ganglia of motion in the brain, which is reversed in left-handed persons, the question would still remain—what is the origin of this difference, since it would be the result, as much as the cause, of difference in function of the two halves of the nervo-muscular system? The primitive condition we must suppose to have been one of perfectly symmetrical structure and ambidextrous function. For this is the condition of all the higher vertebrates which can be best compared with man; complete bilateral symmetry of all the organs is the state of the human embryo at an early stage; and all the simpler actions, such as climbing, rowing, swimming, are performed with both hands. The alternate action of the limbs in the horse, and that of both sides together in the camel, would equally imply complete symmetry of the nervous centres, though even here we seem to have the first step to differentiation, indicated by the preference for the right foot to lead with in the canter, which is impressed on saddle-horses for our convenience.

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[1] Dr. J. H. Jackson, in a paper read before the British Association at Norwich (1868), stated his belief that the involuntary utterances of aphasic patients are the result of action of the right side; in other words, " that the left is the leading side" (of the brain), " the right the automatic."

[2] 'Med. Times and Gaz.,' Jan. 27, 1866.   [3] 'Lancet,' March 21, 1868.

[4] 'St. George's Hosp. Reports,' 1869.

It is clear that in the progress of civilisation one or other hand would come to be selected for the more characteristic human actions for which one only is necessary, such, for instance, as wielding a pen or other weapon, but it is not so apparent why the great majority of mankind have made a kind of unconscious social contract to choose the right hand for these purposes. It seems likely, however, that further inquiry into the habits of savage tribes with reference to this question may discover some widely distributed habit—perhaps of sleeping, or of carrying or suckling children—which will throw light on the subject. In default of any better suggestion, might one suggest an hypothesis of the origin of right-handedness from modes of fighting, more by way of illustration than as at all adequate in itself? If a hundred of our ambidextrous ancestors made the step in civilisation of inventing a shield, we may suppose that half would carry it on the right arm and fight with the left, the other half on the left and fight with the right. The latter would certainly, in the long run, escape mortal wounds better than the former, and thus a race of men who fought with the right hand would gradually be developed by a process of natural selection. Such a race would naturally use the right hand also when they discovered how to draw and to write, though, to push the fancy further, one might regard the Chinese way of writing as that of a lingering left-handed race, and the old Greek alternate fashion ($\beta o \upsilon \sigma \tau \rho o \phi \eta \delta \acute{o} \nu$) as a still more ancient ambidextrous method.

By whatever slight advantage the practice of preferring the right hand became general, when once established, education, and perhaps the tendency in the same direction impressed upon the central nervous system by hereditary transmission,[1] sufficiently explain its continuance.

If this view be correct, right-handedness may be compared with the specialisation of the right and left chelæ of the common lobster, in which the strict bilateral symmetry of most crustacea, and of the primitive form from which they have been developed, has been replaced by peculiarities of structure which, in this case, appear to be indifferently right or left. On the

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[1] Mr. R. A. Lithgow writes to say that he himself, his father and his grandfather, have been all left-handed (' Lancet,' October, 1870). Cf. Darwin, "Animals and Plants under Domestication," vol. ii, p. 12.

other hand, complete transposition of the viscera and abnormalities of the great arterial trunks appear to have no connection with differentiation of function, but to be comparable to the similar transposition occasionally observed among gasteropoda, and to other variations which can, in many instances, be explained as due to slight accidents of development during embryonic life.

Left-handedness, then, would take its place as a more or less complete reversion to a condition which has now died out, and equal use of both hands as a similar reversion to the primitive ambidextral condition, of which right- and left-handedness were both modifications. This view would certainly explain the great variations we may often observe in the force of the habit, and in the range of its extent to other organs than the hands, and to other functions than writing, better than any theory which attributes the peculiarity to a definite and complete change in the most important structures of the body.

P.S.—Since writing what has preceded I have examined six specimens of double fœtus with a single umbilical cord, and therefore presumably a single yelk-sac, beside the one mentioned at p. 141. In three of these, from the viscera being completely fused or imperfect, no conclusion could be drawn as to the fact of transposition. In two (Nos. 2548[20] and 2548[21] in our museum) there was no transposition in either double fœtus. In the sixth (No. 2547[20, 21]), described and figured by Dr. Habershon in Vol. III of the third series of these 'Reports,' the thoracic viscera of the left-hand fœtus were normal, and those of the right transposed, as they should be, according to Von Baer's theory. In the last specimen (No. 2547[5 & 6]) described and figured by Mr. Poland in Vol. VI of the second series of these 'Reports,' all the viscera of the left-hand fœtus were again transposed, while those of the right were normal.

Applying this test—and it seems a fair one—Von Baer's theory is not supported by all cases. Moreover, one does not see how it can explain transposition of the thoracic or abdominal viscera alone—a condition which, though rare, has been observed. Nor yet can any explanation which rests on a peculiar position of the yelk-sac apply to transposition of viscera among invertebrata.

NOTES

OF

ABNORMALITIES

OBSERVED IN THE DISSECTING ROOM

DURING THE

WINTER SESSIONS OF 1868-9 AND 1869-70.

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By P. H. PYE-SMITH, M.D., H. G. HOWSE, M.S.,

AND

J. N. C. DAVIES-COLLEY, M.C.

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THE following paper is in continuation of that published in the fourteenth volume of the present series of Reports, and is arranged in a similar manner. The number of subjects dissected in the winter of 1868-69 was 60, and of these only 35 were supplied from outside the hospital. Last session the number was less inadequate, 78 subjects having been taken in, of which the hospital supplied 24. So that the following notes were made upon 138 bodies.

The most important abnormality observed in the *skeleton* was the presence of an additional dorso-lumbar vertebra. After the twelfth thoracic, with normal ribs and last dorsal nerve, came a vertebra, having all the characters of the first lumbar, but with a bone attached to its left side by a synovial joint, three fourths as long as the last rib, flat from before backwards, and tapering, but not curved. The articulation was capitular, on the upper part of the side of the centrum, by a small facet in a line with

those of the thoracic vertebræ. There were no " superior trans-
verse processes " (diapophyses), but a pair of short " inferior "
ones (parapophyses) in a line with those of the succeeding five
vertebræ. These were precisely like normal lumbar vertebræ,
the last with its ordinary peculiarities and ligamentous attach-
ments. Then came four ankylosed and one separate sacral
vertebra, and lastly, the coccyx.

The nerves corresponding with these vertebræ were arranged
in the following way. After the twelfth dorsal vertebra came
out the last dorsal nerve, and below the next vertebra a nerve
which gave origin to the ilio-inguinal and ilio-hypogastric
branches. This then was the commencement of the lumbar
plexus, which was formed of the usual number of nerves, viz.
three and a half. The lumbo-sacral cord also was normal.
Between the last moveable vertebra and the sacrum came out an
additional pair of small nerves, which joined the sacral plexus.
From the sacral foramina five nerves emerged as usual. Of these
three and a half entered into the formation of the sacral plexus.
Below the sacral there were the usual coccygeal nerves, one on
either side. Thus there was an additional pair of nerves entering
into the formation of the sacral plexus, viz. that between the last
moveable vertebra and the sacrum.

A case occurred of the vertebral artery passing through a
foramen in the posterior arch of the atlas. The lamina was much
thicker than usual, and the sub-occipital nerve passed through
the foramen between its lower boundary and the artery.

In one instance the third costal cartilage of the left side was
found to bifurcate shortly after its attachment to the correspond-
ing rib, and to join the sternum by two separate broad pieces,
so as to fill up the second and third intercostal spaces at that
point.

An extensive ossification of the stylohyoid ligament was noticed
in one subject. The styloid process was of ordinary length, and
about an inch below it the ligament became ossified for an inch
and a half, and this piece of bone was united by ligament again
with the lesser cornu of the hyoid. This ossification, which
we have before noticed less completely developed, answers pre-
cisely to the epihyal bone in the dog and other animals. In
this case the styloid process was, as usual, firmly ankylosed to
the skull, but we have noticed it in more than one instance to

be moveably connected by short ligaments with the little bone named tympanohyal by Professor Flower.[1]

An extra sesamoid bone was observed in one subject in the glenoid ligament of the forefinger, at the junction of the first phalanx with the metacarpal bone.

The only variation noticed among the *muscles* of the head or face was a remarkably large retrahens aurem, consisting of two distinct fleshy bundles, of which the lower and extra one arose from the aponeurosis of insertion of the trapezius.

In one case a fleshy slip arose from the posterior tubercle of the third cervical vertebra, and passing down with the levator scapulæ, diverged to blend with the large uppermost process of origin of the serratus magnus. In another subject the right trachelo-mastoid divided into two parts, one passing, as usual, superficial to the occipital artery, the other on its deep surface.

This somewhat resembled another case, in which a fleshy fasciculus arose from the mastoid process under the sterno-mastoid, and passed downwards and inwards, superficial to, and distinct from the splenius, to blend with the upper border of the serratus posticus superior.

On one occasion we found a flat muscular slip arising by a very short rounded tendon from the end of the cartilage of the twelfth rib; it ran from this point, widening from half an inch to thrice that extent, downwards and forwards, to be inserted by a broad and thin tendon into the crest of the ilium for three quarters of an inch immediately behind the anterior superior spine. It was enclosed in a distinct sheath of fascia, and lay between the external and internal oblique muscles, distinct from both, though its fibres were nearly parallel with those of the former. This muscle was present, and had the same size and position on each side of the body, except that the right was not so completely separated from the external oblique as the left.

A muscle was in one subject noticed to arise fleshy from the deep surface of the styloid process, near its base, and to run down with the stylohyoid ligament to be inserted, still fleshy,

[1] ' Osteology of the Mammalia,' pp. 123, 134. Of 20 dry skulls, the styloid process had dropt off by maceration in 3 (1 R., 1 L., 1 R. and L.), leaving the concave tympanohyal exposed.

into the hyoid bone. It did not blend with any other muscle, nor with the ligament it accompanied.[1]

In the same subject a small muscular slip arose from the lower surface of the petrous bone, and passed downwards from the base of the skull, in front of the superior constrictor, which it crossed, and outside the levator palati. On reaching the lower edge of the superior constrictor it gradually blended with the fibres of the middle constrictor.

Among the muscles of the neck an extra one was seen to appear as a slender tendon at the edge of the trapezius in the posterior triangle, having probably arisen from the first rib; it then passed obliquely across the subclavian triangle, and between the scalenus anticus and sterno-mastoid muscles, until it reached the sterno-thyroid, almost at right angles, and joined with it by a well-marked fibrous raphé.

The anterior belly of the omo-hyoid was found in one case to blend completely with the sterno-hyoid on the same side, for some distance before their common insertion; and in another the sterno-thyroideus, instead of having its usual attachment to the thyroid cartilage, passed up to the hyoid bone behind and between the other two depressor muscles, the thyro-hyoid being entirely absent on this side.

A deep muscular slip from the pectoralis major corresponding to the *tensor articuli humeri* of Gruber, was once observed to be inserted into the capsular ligament of the shoulder-joint. Several fresh cases have occurred of a slender fasciculus from this muscle or the latissimus dorsi crossing the axillary vessels at their termination, to be inserted into the deep fascia of the arm. In the latter case it usually passes under the pectoralis major, and crosses the coracobrachialis and biceps before its insertion; and once it was accompanied by a separate tendinous band having the same connexions. Cf. G. Fritsch, in ' Reichert's Archiv' for 1869.

In one instance the pectoralis minor was found to have a distinct fleshy origin from the sixth rib.

Beside three cases of a sternalis muscle, all unsymmetrical,

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[1] This is the second instance seen in our dissecting room. The first was recorded in the ' Report ' of 1868 ; another is mentioned as a new muscle by Mr. Lawson Tait in the ' Journal of Anatomy and Physiology,' May, 1870. See Prof. Macalister's paper on " Varieties of the Styloid Muscles," in the same journal for Nov., 1870.

two others have occurred of a supracostalis anterior (*rectus thoracis*).[1] In one it was found under the pectoralis on both sides. It stretched from the first to the fifth rib, taking thin fleshy attachments to them and to the second, and tendinous ones to the third and fourth. In the other case it only existed on the left side, as usual under the pectoralis minor, and was attached by fleshy processes to the fourth and fifth ribs; but its insertion above had been cut away before it was seen.

In one subject a muscular fasciculus arose by a flat tendon an inch broad, from the upper margin of the third rib, and becoming fleshy, passed up over the serratus magnus and behind the clavicle and subclavian vessels and brachial plexus, till, much narrowed, it was blended with the deep fibres of the scalenus medius.

One muscular abnormality, previously, I believe, unrecorded, was a flat, broad, bundle of fleshy fibres, which arose from the apex of the coracoid process, and was inserted, still fleshy, into the under surface of the clavicle from the middle of that bone to within an inch of its outer extremity (see Plate).

There was no subclavius on this side; on the opposite one (the right) there was no trace of an abnormal muscle, and the subclavius occupied its usual position.

Three cases were noted of a third head of origin to the biceps brachii arising from just below the insertion of the coraco-brachialis; and one of these continued quite separate as a round slender fasciculus until it joined, by two distinct processes, the radial tendon an inch and a half above its attachment, and the bicipital fascia on its deep surface. The extra head was supplied by a distinct branch of the musculo-cutaneous nerve.

Besides various minor peculiarities of the coraco-brachialis before described, it gave off in one instance a separate broad, thin, and fleshy fasciculus, which was inserted into the bicipital

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[1] This muscle was, I believe, first described by Mr. John Wood ('Proc. Royal Soc.,' June 15th, 1865, and May 23rd, 1867), and cases have been since recorded by Prof. Turner ('Proc. Roy. Soc. Edin.,' Jan. 20th, 1868), by Dr. Roberts ('Liverpool Reports,' Oct., 1867), by Dr. Bochdalek ('Virchow's Archiv,' Nov. 18th, 1867), and by myself in the last-named journal (xliii, p. 143). It is figured by Prof. Turner in the May number of the ' Journal of Anat. and Phys.,' for 1868 (p. 393), and an additional case has been published by Mr. L. Tait in the May number of the same journal for 1870.—P. H. P.-S.

groove between the other head and the biceps. Neither division of the muscle was pierced by the musculo-cutaneous nerve.

In another subject a fleshy slip arose from the deep and internal aspect of the biceps near its middle, and having passed under cover of the pronator teres, was inserted by a narrow tendon into the coronoid process of the ulna on the inner side of the brachialis.

In the forearm a muscle nearly an inch wide arose from the oblique line of the radius, just below the flexor sublimis, and was inserted tendinous into the annular ligament.

In another case a strong muscular fasciculus passed from the flexor profundus to the long flexor of the thumb, just above the annular ligament.

The pronator teres had in one case an extra origin by a strong distinct tendon from the tendon of insertion of the biceps.

A large fleshy head, distinct from the rest of the flexor sublimis digitorum, lay in the position of the palmaris longus, which was absent in this case, and ended by joining the tendon to the ring finger. A somewhat similar fleshy slip to the perforated flexor tendon of the index, was in another subject found to arise by a slender tendon from the flexor sublimis before its division ; and here the same condition was found on both sides.

A fleshy bundle closely resembling the last came off in a third case from the deep (posterior) aspect of the tendon of the same muscle to the forefinger, and after passing under the annular ligament was inserted in a fusiform manner into the tendon again, just before its perforation. As before, the palmaris longus has been observed double and absent.

In two subjects the tendon of the extensor carpi radialis longior ended in the same way by swelling into a fleshy belly at the wrist, which then became aponeurotic, and blended with the abductor pollicis at its origin; in one of these the tendon was also inserted into the base of the metacarpal bone of the thumb. The abductor pollicis was in a third case joined by a tendinous offset from the extensor ossis metacarpi.

One fresh instance occurred of an extensor brevis digitorum manûs. It arose fleshy from the dorsal ligaments of the carpus and divided into a large tendon, joining that of the common extensor to the middle finger, and a small one, which united with that of the indicator. (Cf. vol. xiv, p. 441.) In the same

hand the extensor minimi digiti was inserted by three tendons, distinct from one another and from that of the extensor communis. The extensor ossis metacarpi had often a double tendon of insertion. A second instance of an extra fleshy head to the second dorsal interosseous muscle arising from the posterior carpal ligaments was noted this year.

Among the muscles of the lower extremity one case occurred of the psoas parvus tendon passing under Poupart's ligament to be inserted between the small trochanter and the linea aspera. In another case the coccygeus was prolonged backwards, on the left side only, by a thin layer of muscular fibres which arose from the fascia over the pyriformis and were inserted into the coccyx.

In one subject a large muscle was found between the superficial and deep layers of the calf, which arose by a broad flat tendon from the oblique line on the back of the tibia and the fascia covering the flexor longus digitorum. It quickly became fleshy, received a reinforcement from the fibula, between the attachment of the soleus and flexor longus pollicis, and passed down to about two inches above the internal malleolus, where it gradually ended in a rounded tendon, which was inserted into the calcaneum to the inner side of and quite distinct from the tendo Achillis. This "second soleus," as this additional muscle was named by Cruveilhier, closely resembled the longer one described in p. 442 of the fourteenth volume of these Reports, but was not so markedly bipenniform.[1]

The peronæus brevis in one instance sent a slender but very distinct tendon onwards from its insertion to the base of the first phalanx of the fifth toe, but without joining the common extensor tendon, as we have seen it before.

A very large peronæus tertius was once observed to be inserted by tendons into the bases of the fourth as well as the fifth metatarsal bones.

A third head to the gastrocnemius was observed in one instance. It arose fleshy from the smooth triangular surface

[1] I am indebted to Mr. John Wood for the following references to this muscle, or others closely allied: Meckel, "Muskellehre" (p.586); Gantzer, "Diss. Anat. Musc. Var." (1813); Rosenmüller, "Thesis de nonnullis musculorum varietatibus" (1814, p. 8); Hallett, 'Edin. Med. and Surg. Journal,' for 1848 (No. 174, p. 23); Quain's 'Plates' (No. 85, fig. 1); Wood, 'Proc. Royal Soc., 1864.—P. H. P.-S.

at the back of the femur, and completely covered the popliteal artery as it passed down almost vertically, as thick as the little finger, to end in a slender tendon which joined the intermuscular raphé between the two normal heads of the gastrocnemius. In the same subject a flat fleshy fasciculus arose from the deep fascia over the long flexor of the toes, three inches above the ankle, and after becoming tendinous, passed under the internal annular ligament upon the tendon of the flexor digitorum longus, and ended by joining the same tendon on its deep aspect, where it united with that of the flexor longus hallucis. In one body the plantaris arose on both sides by two heads, one from its usual point of origin but unusually large, the second from the posterior ligament of the knee-joint; the latter joined the tendon of the muscle about two inches after its origin. The tendon itself was broad at its insertion, and completely ensheathed the tendo Achillis.

The adductor hallucis in one very muscular subject sent a large fleshy slip off to the base of the first phalanx of the second toe.

A double long flexor of the great toe was once observed. The extra head was bipenniform in structure, as large as the normal one, and ran with it, though quite separate, down the leg on its tibial side, and, in the same sheath, behind the inner ankle. It then ended by a strong tendinous attachment to the base of the sustentaculum tali.

By a somewhat similar variation, in two other cases, the extensor longus hallucis sent off an extra tendon just below the anterior annular ligament, which was inserted into the tibial side of the base of the first phalanx of the great toe.

The short flexor of the little toe was in one case observed to arise by a tendon blended with the outer head of the flexor accessorius, without its taking any origin from the sheath of the peronæus longus.

We have again seen more than one example of the abductor ossis metacarpi quinti (Wood).

In the *arterial* system, we found two more instances of the innominate trunk being suppressed, the left carotid and subclavian taking their usual origin, while the right carotid arose

directly from the arch of the aorta and the right subclavian from the descending part of the same arch, passing to its usual position between the œsophagus and the spine.[1] In one of these cases the left vertebral artery arose from the subclavian of the same side and not, as it usually does when this abnormality is present, from the aorta directly as in the seal. In the other it did arise from the aorta. In both, the right inferior thyroid artery arose from the subclavian before it had crossed the spine, and accompanied it to the right side of the trachea, up which it then ran to supply its branches as usual. Except for the internal mammary artery arising in one of these cases from the thyroid axis, the other branches of the transposed subclavian were regular.

The only other abnormality of the primary aortic branches was one of the left carotid arising from the innominate, and passing as usual in front of the trachea to its normal position.

The left vertebral artery was three times observed to rise directly from the arch of the aorta (without abnormality of the primary trunks), and in one of these cases it gave off the inferior thyroid of the same side. In another subject the right vertebral passed through a complete foramen in the posterior arch of the atlas.

More than once, when the superior thyroid has come off low down from the external carotid, its superior laryngeal branch has been supplied by the lingual artery ; and in one case an additional vessel arose from the lingual, just before it passed behind the hyo-glossus, which passed round the ninth nerve, under cover of the stylo-hyoideus, to supply the submaxillary gland.

The facial artery being small in one case, was not replaced as usual by a large transverse facial, that branch being only represented by several small twigs from the temporal; but the internal maxillary sent a large anterior branch forward from under the masseter, and the infra-orbital artery supplied the rest of the facial region.

The left lingual artery in another subject was very small, and ended in the root of the tongue, after giving off its hyoid branch.

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[1] This not infrequent abnormality has been ingeniously explained by Mr. John Wood, as the result of persistence of the right as well as the left fourth branchial artery, as in reptiles and amphibia, in his paper in the ' Pathological Transactions,' vol. x, p. 119.

Its dorsal, sublingual, and ranine branches were supplied by a large submental branch of the facial artery.

The ascending pharyngeal artery of the right side, after rising from the occipital, and sending its meningeal branch through the foramen lacerum, instead of bending back and ending in anastomoses, supplied large descending branches to the whole of the upper part of the pharynx.

In addition to the varieties of origin of the subclavian branches mentioned in the last report (vol. xiv, p. 446) of all of which fresh· cases have been observed, the following seem worthy of mention. In one subject the suprascapular artery from the thyroid axis being so small as not to reach the notch in the scapula, it was supplemented by a large branch arising not (as usual in such cases), from the third part of the subclavian directly, but from the posterior scapular artery.

In one case the deep cervical artery arose direct from the first part of the left subclavian, and passed back to its normal position between the fifth and sixth cervical transverse processes.

In another, also on the left side, the inferior thyroid artery crossed the sympathetic cord anteriorly, instead of passing between it and the longus colli.

In another case the left subclavian, beside a posterior scapular branch from its third part, gave off another, half way between the anterior scalenus and the lower border of the first rib, which ran through the axilla to the side of the chest, so as to form an additional long thoracic artery. The same additional branch was observed on both sides of another body, in which the suprascapular, as well as the posterior scapular arteries, also arose from the third part of the subclavian.

The axillary artery twice again gave off the suprascapular. In one of these instances it arose from the first, in the other from the third part of the parent trunk, and in the latter case passed up to the notch in the scapula, which it traversed together with the suprascapular nerve. The supreme thoracic branch (usually a very constant one in size and distribution) once attained a large size, and passed down with the nerve of Bell as far as the inferior angle of the scapula. Beside occasional instances of union of the circumflex, subscapular, and superior profunda branches, as noticed in the last report, two have occurred in which the axillary trunk gave off in its third part

a branch as large as itself, from which arose successively the subscapular, the anterior and posterior circumflex, and the two profunda arteries. This large vessel lay completely in front of the median nerve and the axillary artery. As before, the dorsalis scapulæ has been occasionally observed to arise directly from the axillary artery near its termination. The long slender vessel called in the last report *arteria thoracica superficialis* has frequently occurred, and most often on both sides. In one case an extra pectoral branch arose from the axillary trunk direct, and passed through a hole in the axillary vein.

A high division of the main trunk of the arm was noted nine times. In three subjects it occurred in the axilla, twice at the upper border of the teres major, once an inch higher; in the fourth the exact point of bifurcation was not noted. In each of these cases the ulnar branch crossed the median nerve, supplying both profunda arteries and the anastomotica, and then passed into the forearm, twice under cover of the muscles from the inner condyle, in the third case superficial to them, being covered only by the deep fascia and teguments; the radial took a superficial course on the inner side of the ulnar, and then across the muscles just named to the supinator longus, and only supplied muscular branches. In the fifth case the division took place at the highest point of insertion of the coraco-brachialis. The secondary branches were distributed as in the previous cases, except that the radial supplied its own recurrent branch. The sixth instance of high division also occurred at the insertion of the coraco-brachialis, but somewhat lower than the last, so that the superior profunda artery was given off by the undivided brachial: otherwise the two cases were precisely similar. The seventh case was on the opposite side of the same subject as the fifth, and only differed in the brachial giving off the inferior as well as superior profunda, and in the radial recurrent arising from the ulnar. In the two remaining cases the bifurcation took place just below the lower edge of the teres major, the superior profunda arising from the common trunk, the inferior profunda and anastomotica from the ulnar, and the muscular from the radial.

A vas aberrans was noticed five times, and twice on each side of the same body. In all but one it arose from the axillary artery between the pectoralis minor and the latissimus dorsi,

and ran down on the inner side of the arm immediately under the deep fascia, over the muscles from the inner condyle to join the ulnar artery ; in one case as low as two inches above the annular ligament. One of these aberrant vessels was very nearly as large as the radial artery. In the remaining case the vas aberrans arose from the muscular branch to the biceps, and ran down superficially to join the radial below the elbow. In this case there was a low division of the brachial artery, the bifurcation taking place upon the tendon of the biceps at its insertion, an inch below the normal point, and the radial ran somewhat upward from this spot to receive the vas aberrans.

In one case the ulnar artery gave off no branches in the forearm on either side. In the right limb the two ulnar recurrent branches arose from the posterior interosseous, which, as well as the anterior, was a separate branch of the radial. In the left a single large branch from the radial gave origin to both ulnar recurrent and to both interosseous branches.

The posterior interosseous artery was once seen to be double, both branches being equal to its normal size. Only a single instance of a large median artery has been noticed since the last report. It supplied the radialis indicis and princeps pollicis branches.

As before, cases have occurred of the adjacent sides of the index and middle fingers being supplied by the radial instead of the ulnar artery, and in one instance it was a large *A. comes nervi mediani,* which took the place of the latter. The posterior carpal branch of the ulnar has also been seen to arise from the posterior interosseous artery. In one subject the following arrangement was noted : there was no superficialis volæ, but the radial artery, after giving off a very large metacarpal branch which anastomosed freely with the digital branch of the ulnar to the second and third fingers at their bifurcation, sent a small branch to form the deep arch by joining a large *A. profunda ulnaris,* while the main trunk passed on between the abductor indicis and abductor pollicis, supplied its princeps pollicis and radialis indicis branches, and ended, still a large vessel, by anastomosing with the superficial arch of the ulnar opposite the base of the index finger, where it was only covered by the common integuments.

The only fresh variety observed among the branches of the abdominal aorta was a double renal artery on each side; on the right they crossed in their course to the kidney.

A long artery arose in one subject from the deep circumflex ilii of the right side, which joined the spermatic cord at the internal ring, and after running through the inguinal canal on the outer side of the cord was distributed to the coverings of the testis. The spermatic artery and those supplying the cremaster and the vas deferens were of their usual course and size.

Three cases of the obturator arising from the deep epigastric artery were observed in the session 1868-9, and eight in 1869-70. In three subjects the abnormality was on both sides (each being counted separately), and in two of these cases the obturator passed to the *inner* side of the femoral ring—once on the right, once on the left side. In all the other cases it passed close to the femoral vein, and so out of danger.

In one subject the obturator arose from the internal pudic before it passed out of the pelvis; and on the same subject the sciatic arose from the gluteal artery above the pyriformis, and ran down over that muscle to its normal position. One case only of an accessory pudic artery was observed. A double sciatic artery was noticed in one subject, on the right side only, each vessel giving off a large coccygeal branch. In another case the coccygeal branch and the comes nervi ischiadici each arose separately from the anterior trunk of the internal iliac.

Only three instances occurred in 1868-9 of the common femoral artery dividing less than half an inch below Poupart's ligament, and in one of these it took place so high as to leave no common branch in the thigh; in each of these cases the profunda ran down on the outer side of the superficial femoral for a short distance, and then gave off its usual branches. In the following session, also, three cases of the femoral dividing higher than usual were observed. In one the point of division was a quarter of an inch below Poupart's ligament on both sides; in another it was at the same spot on the right side, but under the ligament on the left, and in the third it was at the latter point on both sides, so that here there was no common femoral for either limb. In each case the profunda ran down the outer side of the superficial trunk to the place of its normal origin.

In one subject there was no internal circumflex on the left side; a large obturator artery supplied its place. With reference to the origin of the two circumflex arteries of the thigh, our experience during the last two years has been in accordance with that given in the former report (1868)—to which we refer throughout, when its conclusions are not modified by fresh cases. A new variety observed was that of the external circumflex sending all its large transverse branches in front of the rectus instead of behind it, to their distribution on the outer part of the thigh. In another subject the external circumflex arose from the superficial femoral artery, near the apex of Scarpa's triangle, by two short heads of almost equal size. Once also the internal circumflex arose from the deep epigastric branch of the external iliac artery, and ran down beside the common femoral to its usual point of origin from the profunda, after which its course and branches were normal.

The external plantar artery was once noticed, after a normal course to the first interosseus space, to pass back again over the interossei to the outer border of the foot, and from the second arch thus formed the digital branches were derived.

The only fresh peculiarity observed in the *venous system* which appears worthy of special notice was that of the left renal vein passing to the inferior cava behind instead of in front of the aorta. We can testify to the correctness of Mr. Gay's statement that the short saphenous vein often pierces the deep fascia where the fleshy joins the tendinous portion of the calf instead of in the popliteal space, and runs to the ham between the fascia and the soleus and gastrocnemius. In these cases we have found a small vein occupying the normal position of the short saphenous trunk.

Of *nerves*, the infraorbital branch of the trigeminus emerged in one instance through two foramina from the superior maxilla, the additional one being above and internal to the other. In another subject the lachrymal nerve gave a branch to the lenticular ganglion, which apparently took the place of its long root,

as no branch to it from the nasal nerve could be found; this arrangement was found in both orbits.[1]

As before, an apparent origin of the descending branch of the ninth nerve from the vagus has been frequently noticed, and in more than one instance we were able to ascertain its real connection with the hypoglossal trunk.   Probably a similar explanation would apply to another case observed last winter, in which the pneumogastric supplied the depressors of the hyoid bone by two large branches arising from the trunk opposite the hyoid bone and thyroid cartilage respectively, the descendens noni being entirely absent on this side.

In another case the descendens noni gave a distinct branch to the sternal head of the sterno-mastoideus.

We have seen a second case in which the recurrent laryngeal branch of the right vagus came off an inch above the subclavian artery and passed up to its usual position without winding round that vessel.[2]

The nerve of Bell in one case, after arising from the fifth and sixth cervical trunks as usual, was joined by a branch coming directly from the seventh, which passed into the axilla, and did not unite till opposite the sixth rib. There was in this case no separate branch to the upper digitation of the serratus magnus, nor were the two branches forming the normal nerve of Bell separate beyond the clavicle.   The median nerve has been noticed to send a considerable branch through the fibres of the brachialis anticus to join the musculo-cutaneous.   The ulnar nerve once gave a considerable offset to the anterior interosseous branch of the median ;—this offset came off immediately after the ulnar branch to the deep flexor of the fingers, and passed behind the ulnar artery.

The patellar branch, usually supplied by the long saphenous nerve, was in one case given off by that which supplies the vastus internus.   In another the musculo-cutaneous nerve of the leg came off in two parts, one direct from the external

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[1] Schlemm ('Obs. Neurologicæ,' 1834, p. 14) describes the long root giving a branch to the lachrymal, adding: "eddito hocce ramo ad nervum lacrymalem, radix longior in ganglion ophthalmicum inseritur."

[2] Cf. Krause und Telgmann, 'Die Nerven-Varietäten beim Menschen,' 1868, p. 18.

popliteal, supplying half the fifth, the fourth, and half the third toes; the other from the anterior tibial high up, and supplying the rest of the third, half the second, and half the great toe, the anterior tibial itself supplying the rest of the great and second toes as usual. Besides cases of the short saphenous branch supplying the little toe and half the fourth, we once noticed it taking the whole supply of the dorsum of the toes up to the branch of the anterior tibial to the second, while the external branch of the musculo-cutaneous ended on the dorsum of the foot.

In one subject the superior cervical ganglion of the sympathetic was double its usual length, extending as far down as the lower border of the fourth cervical vertebra. Like other observers, we have found its size very variable within smaller limits, and have occasionally seen it more or less completely divided. But in one case, on the right side, while the three normal cervical ganglia were of full size, a fourth was interposed midway between the superior and the middle.

A fusiform ganglion, a third of an inch in length, was found in one instance on a small branch of the ulnar nerve, which arose high in the arm and accompanied it till both had pierced the internal intermuscular septum, when it turned again forwards through the septum, and ended by joining the posterior branch of the internal cutaneous. The ganglion was found on the nerve just above the point where it pierced the septum a second time. When hardened in chromic acid, transverse sections showed it to contain no ganglionic cells, but the connective tissue between the tubules was much increased in amount. A very similar ganglion was also noticed in one of the subjects dissected for the anatomical lectures.

Only a single example of a horseshoe kidney has occurred, the union being, as usual, below. In another body, however, both kidneys were fused into a single shapeless organ, placed in front of the promontory of the sacrum to the right of the first part of the rectum, and giving off only a single ureter. A diverticulum of the ileum about three inches long was noted coming off two feet from the ileo-cæcal valve, and connected with the right side of the lumbar spine by a distinct mesentery. On both sides of one subject the ureter was found lying between the renal artery

and vein at the hilus of the kidney, the artery being hindmost. The bladder was in another subject connected with the symphysis by a strong fibrous band, two inches broad, above the ordinary (true) anterior ligaments, and separated from them by loose connective tissue.

DESCRIPTION OF PLATE

Illustrating the Paper on Abnormalities observed in the Dissecting Room during the Winter Sessions of 1868-9 and 1869-70.

The left scapula is seen from the front, with the clavicle somewhat rotated on its own axis.

* * The abnormal muscle.
* *p. m.* Pectoralis minor.
* *c. t.* Conoid and trapezoid ligaments.
* *s. s. a.* and *s. s. n.* Suprascapular artery and nerve : both passed under the ligament.

SOME OBSERVATIONS

ON AN

OUTBREAK OF DIPHTHERIA IN THE OBSTETRIC WARDS.

By J. BRAXTON HICKS, M.D., F.R.S.

THE following is a short account of the cases alluded to by Dr. Steele in his statistical report for last year, which occurred in the obstetric ward of Guy's Hospital in December, 1869, when an attack of diphtheria began first in a patient recently admitted with anasarca coupled with pregnancy. She aborted, and was attacked by the above-named complaint, the case being reported below. It extended to others, but it was remarkable that those only were seriously attacked who had had some surgical interference ; at least, although some sixteen were influenced by it, yet no one in the ward besides those operated on had any sign of anything more than slight sore throat.

It is also worthy of remark that about a week before the first case of diphtheria occurred a woman, who had been in a few days for a plastic operation on the perinæum, became covered with redness and burning of skin, with subsequent peeling of the cuticle. She was not my patient, so that I was not aware, nor, indeed, was she suspicious, of the possibility of its being scarlatina till the latter symptom pointed it out.

What connection there may be between scarlet-fever poison and diphtheria it is impossible to say. It is a curious fact, however, well known to many engaged in general practice, that after some cases of diphtheria have occurred in a house among children it may cease, and scarlatina then make its appearance. In a school, of which I have knowledge, of about forty boys

three were taken ill of diphtheria, whereupon that disease ceased to appear, but was replaced by scarlatina. Numerous instances have occurred in this way. This does not prove their being of the same kind, because we know measles to occur in collections of children shortly after an attack of scarlatina; still, it is not common (as far as I am aware) that in a school the first boys attacked should have measles, and those later on scarlatina.

Be this as it may, up to the period of the case of scarlatina in our wards there was no illness like that which succeeded.

Of course, it may be argued that all the cases reported were not affected by the diphtheritic influence, and this objection cannot be positively answered; but such results as are here mentioned had been very rare up to that period, nor have they since recurred. And inasmuch as all the cases occurred within a fortnight of one another, and that the first and last case had certainly diphtheria, it is a fair inference that an untoward influence derived from that source had marred that recovery which we had every reason, from ordinary experience, to expect.

It is the habit of looking so much for the ordinary symptoms of a specific poison which hinders us from recognising the untoward influence the same poison may exert in a system exposed to any lesion which requires good health for reparation. So small a quantity of baneful influence is sufficient to produce imperfect reparation of damaged tissues, and so slight is the line of separation between the tendency to good or bad recovery, that we are apt, till our attention is closely drawn to the subject, to overlook these important influences. That which one often puts down to a non-disposition to " heal " is quite as often, if not more often, dependent on the system being influenced in a less degree by a poison which in greater quantity would produce the violent forms of pyæmia. Let this be fully recognised, and careful attention will be amply rewarded by far more satisfactory results. Numberless causes of a detrimental kind surround us all, and the utmost care is required lest they affect those who require reparation of damaged parts. This is equally true in the surgical as in the lying-in room. It matters not in practice whether we believe in the living germ theory or in floating poison; but that what attacks the patient has a material existence, and is capable of being diffused, driven away, or destroyed, seems to be completely proved.

That it can enter the system either by the lungs or by the abraded surface is also clear, and that it acts more rapidly by the latter means is more than possible.

However, I have thought the narration of these cases may assist in our knowledge of the matter, and the reader is at liberty to draw his own conclusions from them.

CASE 1.—A patient was admitted five months pregnant, having general anasarca, with albuminuria. After being in a few weeks she spontaneously aborted. The placenta came away well. After about five days she was feverish, and had pain in the lower part of the abdomen. On examination I found the fold between right thigh and swollen labium covered by a large diphtheritic patch four inches long by two broad. Although this became less in extent, she every day became lower, the tenderness in the lower part of the abdomen greater, and a decided hardness felt to be within. She vomited, and had furred tongue, rapid pulse, and at the end of ten days after confinement died. The post-mortem examination showed kidney disease (Bright's) rather recent ; peritonitis extensive, with effusion of lymph in left groin enclosing purulent fluid.

CASE 2.—While the first patient was succumbing I removed a fragile calculus from the urethra of a woman who had just entered the hospital. She went on well for about three days, when she complained of being feverish and tender in the urethra. On examination the parts, which had been abraded, were covered by diphtheritic layer running up to the bladder. In a few days cystitis came on. To relieve her pain morphia was injected into the arm. The spot inflamed and suppurated. About three days after this a swelling over one knee came on. Matter in a day or two was found and let out. On her shoulder also the same occurred. In the mean time her constitutional symptoms became very severe, and it was evident that pyæmia was present in its worse form. As she was sinking, and her husband was anxious for her removal home, she was taken out, and died shortly after.

CASE 3.—At the same time this last narrated case was operated on another patient underwent a partial operation for atresia vaginæ, extending about two and a half inches, the intention

being to complete it in a few days. She was, however, taken with severe feverishness, great local tenderness, and cellulitis on one side of the uterus. She remained very feverish for one month, the pulse being 110 to 120 p. m., and the temperature 100° to 102° constantly. Of course it is well known that vaginal operations are occasionally attended by diffuse inflammation, and even fatal peritonitis. Whether this were so in this instance I cannot say, but I had not had any such result before.

This patient ultimately recovered.

CASE 4.—Within a few days of these cases a woman was tapped for compound ovarian dropsy. The trocar went through solid portion, and though introduced twice it failed to draw off fluid. The cyst was very high up and posterior, and could not be tapped from the front even three inches above the umbilicus. She had symptoms of inflammation of the cyst throughout, and the wounds caused by the tapping became very inflamed, and a blister spread from them for an inch and a half. Decomposition of the fluid in the cyst took place, fœtid gas being largely generated, which was drawn off by the exploring trocar twice, at so high a point towards the epigastrium that it would have been dangerous to have used a large trocar in case the intestine had been in front. She lived after the tapping about three weeks. It was found that the whole tumour, which was very compound, had become inflamed, putrid contents being in the cysts.

CASE 5.—At the same time another woman, with compound ovarian tumour, was tapped in the largest cyst. Suppuration of the lining membrane walls of that cyst took place, attended with constitutional symptoms of such severity that her death appeared imminent. The vomiting was incessant, and injections per rectum were employed for some days. She somewhat improved, but the cyst rapidly filled, and, when it was about a month after tapped, a large quantity of purulent fluid was drawn off. The cyst was washed out with weak iodine water, and the irritative symptoms subsided. When she was some time after again tapped pus was absent. This patient recovered.

Whether the irritation of the cyst in this case was owing to

the atmospherical condition of the ward no one can pronounce, but taken in combination with others it seems to me to point to this conclusion.

CASE 6.—At the same time an elderly woman was under treatment with malignant disease of the bladder. She was attacked with severe sore throat and slight diphtheroid exudation, coupled with high feverishness. From this she ultimately recovered, though she subsequently died of the malignant disease. It was after dilatation of the urethra, and removal of a large bulging mass from the wall of the bladder, that the symptoms appeared.

CASE 7.—Towards the termination of these cases a woman about seventy years old was admitted, suffering very severely from intense tightness of the abdomen caused by a semi-fluctuating ovarian tumour. It was considered necessary to tap her; but the contents were gelatinous lumps, to be abstracted only by much assistance from pressure and clearing of the canula. About three fourths of the contents of the principal cyst was obtained. Next day she went on tolerably well, but the opening discharged fluid. On the third day this became offensive and plentiful, producing a fœtor in the ward.

The pulse was about 110, and the temperature 97°. Finding these symptoms not in accordance with the state of the cyst, and knowing that they were like the effects of diphtheria, I examined the throat, in which she insisted she had no distress. However, the whole fauces were covered with a thick diphtheritic layer.

She continued in this state, with cold skin and slow pulse, for three days, when she died, the smell from the cyst-discharge being almost unbearable, although the cyst was twice a day washed out with disinfectants.

CASE 8.—About the middle of the fortnight during which this attack lasted a young woman with inversion of the uterus was placed under chloroform, and an attempt at restoration was made. It was unsuccessful, but next day symptoms of much feverishness occurred, and subsequently tenderness of uterus. Shortly after anasarca came on, with albuminuria coupled with long and severe

vomiting. She ultimately died of uræmic poisoning. Recent Bright's kidney was found, and an abscess in the ovary running up the psoas nearly to the left kidney. Now, she had been subjected to the same treatment before without irritation, and it is curious that the symptoms were general at first. The kidney complication is also very remarkable.

After the death of this patient the ward was emptied of the remaining patients, and thoroughly disinfected.

It is proper also to observe that about the commencement of this attack there were some cases of malignant uterus in the same division of the ward, the discharges from which were very offensive. As the result of experience we know it is not well to keep many cases of this kind in one ward, for whenever the effluvium is powerful it has a distinctly detrimental effect on other patients.

ON SOME

CASES OF GENERAL PARALYSIS,

WITH A FEW REMARKS ON

NERVE PATHOLOGY.

By SAMUEL WILKS, M.D.

In all cases of disease of the nervous system where there is loss of function it is probable that there is some corresponding morbid condition of special portions of the centres, or of the nerves which proceed from them. In exaltation of the nervous functions this is doubtful. In the first instance, if the case be fatal we invariably discover tangible lesions to account for the phenomena, and even should it be recoverable we can picture to the mind's eye some appreciable alteration which may for a time arrest the activity of the centre. We have an example of this when a hemiplegia follows a ligature of the carotid artery and the paralysis subsiding after a few hours, we infer that there was a temporary arrest of the circulation in the brain. We can therefore have no difficulty in understanding how a modification of the arterial supply through the influence of the nerves on the blood-vessels may affect the activity of a nerve-centre. In the case of exalted function no more readily conceivable ideas have been suggested as to the condition of the structures than those conveyed by the vague term dynamic changes and altered polar arrangements of the ganglionic cells, and thus we must confess our ignorance of the pathological states in such affections as mania, tetanus, or convulsions.

If the nerve of a limb be divided the totality of its functions

is lost, sensation in all its forms has disappeared, motor power has gone, both that directed by the will and that reflected from the cord, and the portion of the limb to which the nerve was distributed wastes away in consequence, it is supposed, of the suppressed influence over the vessels or nutritive processes which that nerve exerted. This proves that an ordinary compound nerve has many fibres possessing different properties. It is still a question whether the nerve which carries impressions to the sensorium and the nerve which conveys the mandates of the will to the muscles are the same as those which convey the impression to the cord and the reflex influence back again when connection with the brain is severed. It is also a question whether the vaso-motor nerves are distinct filaments or not; if the former, whether they proceed direct from the spinal cord or originate in the sympathetic system, as those which so thickly cover the blood-vessels in the abdomen; or if not independent, whether the vessels are influenced through the ordinary motor nerve. Also whether there is a distinct nerve for a muscular sense; also, since there are different kinds of sensation, whether there are separate nerves to convey these various impressions; that is, since there may be an anæsthesia in one case and an analgesia in another, whether two distinct filaments are required to convey the sense of feeling and sense of pain besides others to convey sense of temperature, &c., or whether these are but modified conditions of one sense. According to the former point of view each nerve contains within itself eleven or twelve distinct fibres, possessing as many different functions. If this be not accepted, we must at least admit, both from physiological and clinical observation, that the sensory motor and nutritive functions may be entirely separated.

If the spinal cord be cut through in any part a paralysis of the limbs below results, and the same occurs if a tumour be slowly growing in the medulla; but this paraplegia appears to be one apparently of motion and sensation only, as it has not yet been proved that there is any necessary or active wasting beyond that which accompanies all muscles at rest. The more external motor tracts and the more internal sensory being divided, all connection between the limbs and the brain is severed, but the cord below being perfect and its function undamaged, the excito-motor action can still be produced. Whether the nerve-

cords which under these circumstances carry the impression to the medulla and motive influence back are distinct fibres, or whether they be the same which are employed in the transit of impressions to the brain, has received no solution from pathology. Should the whole cord below the point of severance be diseased or injured, then the true spinal or excito-motor function is destroyed and the paraplegia is complete.

In practice we constantly meet with a perfect paraplegia of motion and sensation with the excito-motor function perfect, and thus we can affirm the presence of a limited disease with a healthy cord below. In such a case which occurred lately, and where such a diagnosis was made, it was only after a careful search that a tubercle was found in the very midst of the cord. Very commonly the true spinal function becomes slowly lost after the occurrence of a sudden paralysis of motion and sensation, showing that disease is gradually creeping on into the substance of the medulla. Whether the nutritive process is affected at the same time has received no conclusive answer from clinical observation. An extreme wasting has constantly been observed in spinal disease, but in such cases no accurate statement has been made of the condition of the nerve-roots and sympathetic, and, on the other hand, paraplegia of sensation and motion of months' duration is constantly observed without any approach to that atrophy which is supposed to occur when the vaso-motor nerves are affected. But let an injury to or even fracture of the spine occur followed by a paralysis of one arm only, then it will be found that the limb will waste, because there was a lesion of the nerves and not of the cord.

In one case we may find motion alone is lost and in another sensation; this shows that the nerve proceeding to the part affected is only partially paralysed, that some fibres alone are involved, and we infer that in the one case it is the more external part of the cord which conveys the motor fibres which is affected, and in the other case it is the interior which conveys the sensory. As regards sensation, it need not be that the totality of the sense is lost, since in one case common feeling remains though the sense of pain is absent, or both these have departed whilst the patient still appreciates a difference of temperature. If to this be added the sensation produced by tickling, we might have even these three absent and the fourth remain.

We have not yet, however, proved the truth of Brown-Séquard's opinion, that each sensory nerve contains four distinct fibres, by clinical observation; that is, that different tracts of cord are found affected which might be thought to correspond to the loss of these different functions; our present state of knowledge will allow us only to look to one part of the cord when motion is lost and to another when sensation is lost, but not to discriminate amongst the various forms of the latter, so as to discover their separate seats; also, if the true spinal function is in abeyance, to allow us to conclude where the seat of the disorder may be; but if the nutritive processes are at fault we scarcely yet have any evidence to show to what lesion the change is due. We have not yet arrived accurately at the knowledge of the course of the vaso-motor nerves when situated in a large trunk, whether distinct through their whole course, or whether blended with the motor and sensory, and through these that the special nutritive influence is imparted. If they be distinct filaments we have yet to learn their origin. Stilling, many years ago, traced them into the spinal cord, and we know that irritation of particular spots of the cord will produce the same influence on the blood-vessels as if the sympathetic itself were touched; but there are some who would place their origin altogether external to the cord, and proceeding directly from the sympathetic. As regards clinical experience, although atrophy is often seen in paraplegia, we frequently meet with the latter without any active wasting, which would show, I think, that complete destruction of the cord may occur in any one part without nutrition being directly affected. There appears, however, to be some intimate connection between the nutrition of the muscle and the integrity of the motor nerve which supplies it, since if the latter be injured the paralysis is associated with wasting. Also in the disease known as progressive muscular atrophy, although we are unable to appreciate any change in the larger nerve-trunks, yet it is evident that the motor fibre is at fault, for if we trace it up to the spinal cord we find the anterior root diminished in size, and should the muscles supplied by the lingual nerve be affected then the latter has evidently undergone an atrophic change. One of the most interesting questions, therefore, in nerve pathology is to discover by clinical experience the cause of atrophy; we observe it in the muscles when the motor nerves are at fault,

we believe it may be due to a morbid state of nerves supplying the vessels, and we sometimes apparently witness it when the sensory nerve is at fault, as in paralysis of the fifth pair. Further inquiries are wanted in this direction, and it would not seem difficult to ascertain in a general way the different processes in operation in cases of brain or spine disease where there is wasting or the reverse. Would the effect on the nutrition of the legs be the same if the cord were cut through at its lowest part, or the plexuses proceeding from it be divided? My belief is that in the latter alone there would be active wasting. I ask myself why in the case of two lads suffering from tumours at base of brain their symptoms are identical, with the exception that one has emaciated whilst the other has grown fat. I might here allude to the case of functional paralysis of the hysterical kind, where it might presumably be held that all functions would be arrested, and consequently we find the patient can scarcely stand or walk, at the same time that she has lost feeling and sense of pain in the skin and the limbs are congested and cold.

We seem thus to have a pretty clear field before us in which to pursue our inquiries; we have some facts tolerably certain, others obscurely defined, and other propositions still to be elucidated for example if there are true trophic nerves.

We can say that, if motion and sensation are lost in a limb, the connection between it and the sensorium is cut, but that if the excito-motor function still exists the cord remains healthy. If this is lost, then the spinal marrow itself is diseased, but under these circumstances we are not sure that there is any active wasting of the limb, and that there is not needed some additional disease of the nerves outside the cord to account for it.

If atrophy does occur we might explain apparently opposed facts by taking another view of muscular wasting. On the supposition that the nutritive process generally is dependent on a good supply of blood, and that the vessels conveying it are regulated by special nerves, it does not follow that paralysis of the motor nerves which supply a muscle should not also at the same time induce its atrophy; for if it be true that a nerve-fibril enters the sarcolemma and terminates as a plate in the muscular substance, it would follow that such a fusion would almost necessitate a wasting of the tissue if the function of the nerve

were in any way interfered with. Again, it is not sufficiently remembered, when standing by the bedside of a patient, that paralysis arising from injury to or disease of the cord may mean two things—it may merely imply that a severance has taken place between the cord and the sensorium, or it may mean that the whole medullary substance is diseased. Now, supposing that the nutrition of the muscle depends upon the integrity of the motor nerves and the strands from which they arise, there is no reason why, in the first instance mentioned, there should be any tendency to wasting. I might here call remembrance to the cases of wasting of the deltoid from falls on the shoulder injuring the circumflex nerve.

Again, if motion be alone destroyed we may consider that the more superficial strands of the cord are affected, but the more deep seated if sensation also is impaired. Cases of disease of the centre alone are not common, but those which have been observed have tended to confirm this view, and thus it would follow that should a person be well enough to walk about, and be at the same time anæsthetic, it is scarcely possible to believe in the existence of a deep-seated malady of the spinal cord; under these circumstances the anæsthesia would be functional or hysterical. As regards wasting, the only piece of pathology which appears certified is that the anterior roots of the nerves are found atrophied. I might also allude to the association of the symptoms known as those of ataxia, with degeneration of the posterior columns of the spinal cord, and inflammatory changes in the posterior roots of the spinal nerves, but neither the symptoms nor the morbid appearances have positively informed us what function is at fault. There are those who would believe that the implication of the roots of the sensory nerves, and the consequent anæsthesia, were sufficient to account for all the phenomena of the disease; others, on the hypothesis that there is a distinct muscular sense, can easily explain the symptoms on the supposition of a paralysis of the nerves which convey this sense. Such nerves, however, and the source whence they spring, have yet to be discovered.

If, in truth, an ordinary nerve does contain within it a dozen different fibrils, possessing as many different functions, it would almost necessarily follow that every one of these has its separate origin or termination in some part of the cord or ganglionic system.

It therefore behoves us to narrowly seek in these centres for spots of disease when any one of these twelve functions is lost. If we imagine a nerve to arise like the trunk of a tree, by numerous spreading roots, and imagine these roots to be radiating in various directions, and to have different functions, so as to give the trunk many different properties, it is clear that if the latter has lost one of these properties we may find the cause in disease of one of its roots, and thus in the case of a special form of paralysis we seek for its origin in some particular part of the spinal cord. This we may at some future time be able to accomplish.

In cases of paralysis which recover we cannot, of course, believe that any changes occur at all resembling those which are seen in fatal ones, unless we except that condition which may be due to the formation of an inflammatory material, and the presence of which would interfere with the activity of its function, and yet on its absorption be again perfectly restored. The remarkable recoveries under the use of iodide of potassium require us to believe this. In other cases we may seek for an explanation in the altered vascular supply, which may be regarded as an efficient cause, but as regards dynamic changes and other subtle alterations in the ganglionic cells we have no knowledge of them. That the area of disease in the cord is determined by some anatomical reason, appears clear, since certain definite functions are repeatedly affected, and there seems no other explanation of the fact that every organic disease of the cord, with its special symptoms, should be simulated by a functional one. We can only suppose that certain areas are anatomically defined by vascular supply or continuity of nerve fibre. For instance, in a case of effusion of blood into the corpus striatum a hemiplegia results, but the same ensues if the vessel supplying this part of the brain is blocked by an embolon, or even should the blood be temporarily arrested in this part. If, then, a hemiplegia exist for ever so short a period, as in epilepsy, we must presume that this same central organ is in such an altered state as to lose its activity. In the same way, as regards the spinal cord, since there is no organic disease having a definite and local cause but what may be simulated by a functional one, we are led to the conclusion that all symptoms

associated with a depressed nerve function must be due to a definite altered state of a particular part of the nerve-centres.

Just as the cord, when affected in different parts, is productive of special symptoms, so also an implication of the roots of the nerves, as they issue from the cord, might produce the same results, viz. a partial or complete paralysis of motion or sensation, a pain or a reflex action on the cord itself. Whether nutrition of tissues is affected when the roots of the nerves are alone involved has not been investigated clinically, but it would seem that it is so when the anterior roots are injured.

Having a clear view before us of functions lost in connection with disease of particular parts of the nerve-centres, we can also see how the symptoms associated with these would vary according to the modes in which these changes come about, and thus a paralysis might be sudden or slow, be attended by pain, tremor, or spasm. A slow inflammation from without, involving the membranes, might be the source of constant irritation, increased excito-motor activity, and if the roots of the nerves be involved, of actual pain or subsequent anæsthesia. Thus, in spinal meningitis there is a spasm of the limb or opisthotonos, as is so constantly observed in the epidemic form of the disease. In cases of tremor followed by a spasm or contraction of the limb a hardening of the tissues has been observed. The symptoms, therefore, vary according to the nature of the changes.

After regarding the spinal cord as a whole, and the affections which result from its lesions, we pass up to its summit, where it terminates in the midst of the brain proper by two great ganglia, the corpus striatum and thalamus opticus. The division of the cord into two branches clearly has reference to the independence of the limbs. The trunk being formed by the union of the two halves of the body, and moving as a whole, is governed by nerve-centres blended into one, and thus the two semi-cords form a whole; and had there been no limbs this arrangement would have sufficed. With these offshoots, however, from the body, and their independent movements, it was necessary that the centres ruling over them should be distinct, and thus the two halves of the cord become separated at their summit. It is found that disease in either half produces paralysis of the limb on the opposite side, and but little more. It is generally said that a

hemiplegia is the result of their impairment, but this is not correct, since the half of the body is not paralysed. The loss of function is almost confined to the arm and leg, but not entirely, for there is generally some partial loss of power of the seventh and ninth nerves. This would seem to show that these nerves send some fibres to the large central ganglia, and the purpose may be for the will to exert some independent power over each side of the tongue, and the lower part of each side of the face. This might be more necessary than in the case of the orbiculares palpebrarum, which can be understood to be supplied altogether by fibres from the seventh, having their origin in the well-known common nucleus, for these muscles seem less independent of one another than the muscles of the lower part of the face; thus, with many persons it is difficult to close one eye without the other, and in cases of paralysis of the trunk of the seventh we may observe the paralysed eye shut when the attempt is made to close the other. These considerations lead to the conclusion which all recent investigations, physiological, anatomical, and clinical, tend to confirm, that the nerves have several separate central origins ; that is, that a single motor nerve supplying certain muscles may have its roots spread widely in the spinal cord, and consequently a spot of disease in one place may partially paralyse it together with other nerves, and a spot of disease in another place may also paralyse it in connection with still other nerves. It seems, indeed, as if the seventh nerve could undergo a partial paralysis from disease in a very extended tract. The remarkable inter-weaving of the nerves of the brachial plexus, arising from a long portion of cord, may find its explanation in a like supposition. I have said that disease of the corpus striatum or thalamus paralyses the limbs, but it has not been discovered which por-tion of them rules over the upper and which over the lower extremity. Nor has it yet been satisfactorily made out in which direction the motor tracts pass, and in which the sensory tracts run ; at least the pathologist has not yet satisfactorily deter-mined from cases of disease whether the physiologist has given us correct information on the subject. I might add that very con-stantly, in connection with right hemiplegia, we have aphasia.[1]

[1] Without entering upon the subject of aphasia, I would wish to repeat what I have before stated, that my own experience tends to confirm the opinion of those who maintain that it is usually found in connection with right hemiplegia. I say

As we asked the question whether nutrition is affected when the spinal cord is diseased, so we may inquire whether in disease of the central ganglia, with its accompanying so-called hemiplegia, there is any tendency to wasting. My opinion is that in neither case is there any necessary wasting. It is well known that in some cases a limb may remain perfectly flaccid and preserve its plumpness, whereas in another case it becomes contracted and is prone to wither. For an explanation of this Dr. Todd looked closely to the brain, and thought that softening and cicatricial changes situated therein might account for the difference. These opinions were found from observation to be untenable, and since that time M. Charcot has demonstrated that in cases of contracted paralysed limbs the nerves themselves undergo a change—a kind of chronic inflammation—in which they are found indurated from the presence of a quantity of new connective tissue developed amongst the fibrils. That such a change should occur is not remarkable, seeing how morbid changes pass from the centres to nerves, and *vice versá*, from continuity of structure. Now, in connection with this change in the nerves, producing contraction of the limb, we may suppose the vaso-motor or nutritive nerves to be involved, and necessarily a wasting would follow. This constitutes, therefore, another subject for investigation, whether in disease of the central ganglia with hemiplegia there is a tendency to active wasting, or whether, if present, it be not due to a secondary affection of the nerves. If this be so, we may find an explanation for those cases of congenital atrophy of the limbs on one side of the body in connection with wasting of the central ganglia. Many cases have been described of persons who through life had possessed a withered limb and in whom an atrophy of the ganglia has been found after death, but hitherto no mention has been made of the state of the nerves of the limb.

this because I find in Dr. Bateman's excellent work on 'Aphasia,' a disposition, if not an actual intention, to controvert this, and he quotes from one of my own lectures a statement to the effect above mentioned, and expresses his surprise at my making it. I would therefore simply reiterate it, and declare that, according to my experience, aphasia is intimately bound up with right hemiplegia. The question is simply one of fact; a man of experience can either answer it affirmatively or not. I know the difficulty those who have discussed the subject of speech have had with such a fact, and their wish to ignore it. My own opinion is that it must be looked full in the face, and is just that obstacle in our view which, if met rightly, would clear up the whole mystery.

In passing to the brain proper we may infer loss of intellectual power, with an altered condition of cerebral substance. If the cineritious matter be affected, there may be active delirium, as in the acute membranous inflammation which involves the surface of the brain.

If chronically affected the intellect is simply deranged. If the brain as a whole undergoes degeneration then there is feebleness of mind and body combined, and this is still more apparent should the spinal cord participate in the disease. I may remark that there is a general tendency for the cineritious structure of the surface and the central ganglia to be affected together, and thus we so often witness an intellectual disturbance and a motor paralysis at the same time, as in old persons and in drunkards. In all probability a morbid action is more readily propagated by the radiating fibres which pass from centre to circumference and *vice versâ*. Under these circumstances we witness a paralysis of the mind and body. Some years ago I carefully examined the condition of brain and spinal cord where such symptoms of general paralysis had existed, and invariably found that there was a visibly altered structure of these organs, and often a manifest wasting.[1] And, on the other hand, whenever I accidentally met with a shrivelled brain, and made inquiries as to the condition of the patient, I invariably found that he had had a diminished nerve-power, exemplified both in his bodily and mental faculties. There could be no doubt that the degenerated condition of the centres and the symptoms stood in the relation of cause and effect. Should a man, for example, present himself to you, and you observe that he totters in his walk, that his hands tremble, that he hesitates in his speech, that his expression is blank, and should you presently discover that he has lost his aptitude for hearing, that he cannot concentrate his mind on any subject, that he is forgetful, &c., it is tolerably certain that the whole of that man's brain, including the central ganglia, is affected. It does not follow that the change is organic ; he may have received a violent shock in a railway collision, have had his brain and spinal cord severely concussed, and afterwards recover. Should such symptoms, however, continue, you may conclude that the change has become structural; if there be no history of accident the disease may have come about spontaneously ; if the patient be

[1] 'Journal of Mental Science,' October, 1864.

very old a senile change may have accomplished it, for just as all other parts undergo a decay so does the brain, and a general feebleness of body and mind ensues. An exactly similar state may be induced by intemperance. Should a young man present the above-named symptoms, as tottering gait, trembling hands, thick speech, and enfeebled mind, we may often discover the case to be one of chronic alcoholism, and the immediate cause of the symptoms a degenerated brain. The intemperate and those dead of delirium tremens almost invariably show such a brain on post-mortem examination. In another case with similar symptoms it may be found that the patient has long been a sufferer from the effects of lead or mercury, but even here the result of the poison on the system is to cause a wasting of the tissues, inclusive of the brain. It is true that an actual visible wasting need not be present, although an extensive degeneration of the tissues may have occurred, for a chronic inflammatory process may be actually tending to the enlargement of an organ at the same time that it is destroying the secreting structure; this is seen in the enlargement of many diseased organs, or in the pseudo-hypertrophy of the muscles. So a chronic inflammatory process may occur in the brain, leading to its destruction, without any visible atrophy of the organ as a whole, but an investigation will show the marked degenerative change which has been slowly taking place. We may find the membranes much thickened, closely incorporated with the cineritious substance, and the latter altered in colour and definition, and showing by the microscope a destruction of its most important elements. Associated with this the spinal cord has also been proved to be affected. The final result of such a change is necessarily a paralysis of both body and mind, but since the degenerative process has come about in a particular way the progress towards this catastrophe is a peculiar one. In all these cases, however, the final result must be the same, a complete failure of bodily and mental power —in fact, a dementia paralytica. It little matters whether the case be one of chronic delirium tremens from alcoholism, or whether the patient be a garrulous old man sitting in his chair, scarce able to stand, slobbering at the mouth, and with his urine running over, for in all these cases the structural change and the symptoms closely correspond. They all may with propriety be styled general paralysis, seeing that the brain

as a whole is affected, and the muscular system is universally weakened.

This term, however, has been appropriated to their own peculiar use by alienists, or those who have made a speciality of the treatment of the insane, and they have adapted it to one peculiar form of the disease. Under the term *general paralysis of the insane* a very characteristic form of disease (when seen in its typical form) is implied, but if modified forms and early stages be included the term is equally applicable to other affections. The limitation of the term is not so strictly defined by writers on mental disease as could be desired. They describe accurately enough a form of disease which they style general paralysis of the insane, a malady characterised by a peculiar mental disorder and a failure of muscular power, first of all noticeable by a change in expression of face or altered mode of speech, having also a definite and not very long duration, and exhibiting on post-mortem examination of the patient certain morbid changes, more especially in the cineritious substance, in association with a chronic inflammation of the membranes of the brain. Writers do not say positively that such pathological changes are invariably found, or that they must of necessity exist in order to constitute the case one of general paralysis of the insane, although this probably must be the case, since like effects must have like causes. Nor do they, on the other hand, in describing the symptoms, declare that the peculiar exalted delusions of the patients are invariably and necessarily present. It would be quite reasonable, therefore, under these circumstances, to ask what is intended by the term general paralysis. It does not signify, alienists say, a mere dementia and paralysis, it does not apply to the case where the old paralytic finally loses his mental faculties, or even where the chronically demented at last sinks into perfect helplessness, but the term is only applicable to the case which in its typical form is possessed of highly characteristic features. From a comparison with other diseases we would not be too strict in demanding a more precise definition, seeing that symptoms are so modified in different individuals, but at the same time we should like to know what it is in the symptoms or in the pathology which constitutes the essence of the disease. The paralytic symptoms are not alone sufficient to mark the disease as present, nor the addition of mental disorder ; nor, on the

other hand, need delusions of the most exalted kind be present, seeing that the patient is sometimes melancholic; nor can it be proved that certain anatomical changes always exist, at least the physician would not desire his diagnosis to depend entirely on what an examination after death might reveal. In other affections, as pneumonia, even should such characteristic symptoms as fine crepitation and expectoration of rusty sputa be absent, we can fall back, if the patient should die, on well-marked morbid appearances to tell us the nature of the disease. So, again, a case of typhoid fever may be unrecognised as such during life, but possesses anatomical peculiarities which identify it after death. On the other hand, such diseases as tetanus or typhus fever, which may present no characteristic post-mortem appearances, are so striking in their phenomena during life that they cannot be misapprehended. And in the disease under discussion, if it be not granted that it is characterised by certain given anatomical changes, we should at least be presented with such features of the disease during life as would render it unmistakeable.

I do not doubt that there is a very remarkable and common disorder which is generally known by the name of the general paralysis of the insane; but seeing that the term is by no means accurately defined, since the peculiar mental symptoms which have actually afforded a name for it in France are not always present, I cannot but find fault with it, and ask for one which is somewhat more restricted, or if not so, demand that the present one be allowed to include a much larger sphere of disease. It is probable that some of those who take special charge of the insane are scarcely aware of the large number of cases constantly coming under the notice of the general physician to which such a term as general paralysis is also applicable. The specialists have cases selected for them on account of some mental peculiarity exhibited by the patient, but they leave untouched a large class of cases which the general practitioner is obliged to deal with. Thus, during the last few months I can bring to my remembrance cases in which no other term than general paralysis could be given, and although to this term I should not like to add the word " insane " yet one expressive of mental failure or tendency to dementia might with strict propriety be used. Dementia paralytica would be a most correct

expression, although " paralysie" or " folie ambitieuse" could not, of course, be used as a synonym. A patient I am now seeing is an example of a class to which a name must be given, and about which a pathological opinion should be formed. A gentleman, aged 35, in a Government office, gradually becomes incompetent for his duties, unable to apply himself to the affairs of his department, forgets names or uses the wrong ones, hesitates in speech, or is unable to find the word he wants. The medical attendant observes that he totters in his walk, that his handwriting is shaky, that his expression is vacant, that his tongue and lips tremble, that his pupils are contracted and unequally so. He endeavours to test over and over again the state of his mind, and finds it enfeebled. He discovers no delusions whatever, and, therefore, none of a " gay " description. So marked is the case that a friend who had made a special study of mental disease is asked to see him, and finds that his appearance exactly tallies with that of the sufferer from general paralysis of the insane ; but when he discovers that no delusions exist he hesitates in pronouncing an opinion, although he thinks it may be a case of the disease, as it is sometimes met with without any peculiar mental disturbance. If, then, a case like this may really be an example of the general paralysis of the insane, I could add to it a number more of the same kind, but any medical man would find it very difficult to certify to their unsoundness of mind in the legal sense, much less could he, because a case terminated in a complete destruction of mind, infer that the patient had been incompetent to manage his affairs at some remote former period, when the presence of slight paralytic symptoms could be proved. I am strongly of opinion that there are far more persons suffering from this simple failure of bodily and mental power, or dementia paralytica, than from the disease to which the name is more usually applied. It is one thing for the superintendent of an asylum to go round his wards and pick out those who are suffering from general paralysis, as the distinction between them and the ordinary insane is well marked, but it would be another thing altogether for him to be placed before a large number of cases, as is the general physician in his hospital or in private practice, and have to select those to which he would give the name. If he took all the general paralytics, those persons whose nerve-force, both of body and mind, is

decaying, and selected only those who had the ambitious or high-flown ideas, he would take with him the minority. If to these he gave a special name, no one would object if it was understood that the term he used for them was applicable to them, and no others. No one could object to the opinion that, since the mental symptoms differed, the cases differed pathologically from those to which they were related, although finally and before death they would probably become all alike.

I find the opinion of the alienist is given with much more decision when the mental symptoms usher in the disease ; when a man is found to be strange in his manner, behaving brutishly to an affectionate wife, signing cheques for large sums of money, inviting friends to his imaginary shooting box; then the doctor comes in, and at once pronounces general paralysis of the insane. He recognises clearly a particular form of malady, although, perhaps at that time it does not present one single symptom of the paralysis by which it is called. It may be said that such a case shows that the profession is agreed to what the term is meant to express, and thus no evil can result; but to this I demur, unless the definition of the term is limited to such a case. As I have before said, it is one thing to distinguish a paralytic patient from a maniacal one, but it is another to choose out of a mass of persons suffering from dementia paralytica those whom the alienist would select for the special application of the term. I cannot but think the definition is somewhat vague, when a man who is an inmate of one of the largest hospitals near London is registered as a case of general paralysis of the insane, and it is found after death that he is the subject of a tumour at the base of the brain.

It is interesting to find the author of a paper read at a meeting of the Psychological Society declare that all cases met with in asylums could be divided into ordinary insanity and general paresis. This means that the one class of cases occur in persons of a peculiar temperament or of hereditament, and that they are easily turned from the equilibrium by the causes which usually act as excitants to the nervous system, but that the other class of cases arise from manifest and material changes in the brain substance, occurring in others than those of the nervous temperament, and arising from accidental causes, as injuries or violent concussions. The disease is one which can be seen in

structural changes, is therefore accompanied by paralysis of body as well as mind, and is fatal within a given period. I have no doubt such a division of cases in asylums as above named is a just one, and, therefore, I can the less agree with those who have attempted to make a pathological classification of all cases of insanity. Of course it may be admitted theoretically that accompanying all mental phenomena there may be changes in the brain amongst the ultimate ganglionic cells, but apart from this one cannot see how the case of the man who through a long life has merely shown strange vagaries can be classified with that which, accompanied by mental and bodily failure, soon comes to an end. The one patient, who from birth is peculiar or odd in his demeanour, may from time to time show an exaggeration of his peculiarities and be confined as a madman, but it may be asked in what recognised pathological state is his brain? In what apparently altered state is that of a gentleman (now in my mind's eye) who, on account of suicidal and other tendencies, with attacks of maniacal excitement, has spent more than half a century in a lunatic asylum? And what can be said of the pathological condition of the brains of those persons who, living on the borderland of health and insanity, spend a part of their life in the gaol and the other in the madhouse. Very different is it with the general paralysis of the insane, a disease as tangible as Bright's disease of the kidney, and probably much resembling it.

I can quite agree with the physician who thus sees in his asylum two classes of cases, for they bear about the same relation to one another as do dyspepsia and cancer of the stomach.

I take it that the matter stands thus :—That there are various forms of insanity associated with peculiar temperaments, and showing well-marked hereditary influences at work in their production, but with these I have nothing to do, and I am considering altogether another class of cases, occurring in connection with cerebral changes. Now, instead of looking upon these with the alienist's eye, it might be better to consider that the brain is liable, like all other organs, to undergo a degeneration. Local diseases are attended by special symptoms, but just as the liver or kidney may degenerate as a whole so may the

brain; consequently, as cineritious structure and central ganglia
are both involved, a failure of bodily nerve-power and mental
activity results; the persons tend towards a general paralysis
of body and weakness of mind. If this be taken as a general
proposition, it is probably true that the mode in which this comes
about may necessarily involve peculiar symptoms. Just so, any
structural disease of the kidney may finally produce a fatal con-
vulsion or coma, and yet as this disease may have been brought
about by different morbid processes so the symptoms may have
varied during its progress. May it, therefore, be that a simple
decay may carry along with it mere imbecility, but that if the
destruction has been produced by a chronic inflammatory
process the mental alienation is peculiar, and attended by
exalted ideas? If so, an injury of the head, which produced
symptoms like those of general paralysis of the insane, was, in
fact, an example of the disease, and in the case of a gentleman
I saw lately it would be a mere question of words whether he
were suffering from general paralysis of the insane or from
delirium tremens. He had been an inveterate drunkard, had
had all the symptoms of chronic alcoholism, and of late had
universal weakness of his limbs, tremor in his speech, and had
been guilty of most extravagant acts in his business. From my
knowledge of the effects of alcohol on the brain I believe he had
chronic thickening of the membrane with degeneration of the
substance. I remember also the case of a gentleman who, after
a railway injury, became feeble in arms and legs until the
whole body was paralysed. He was restless, excited, and had
delusions—in fact, the " monomanie des grandeurs."

What, therefore, I ought to have offered to my readers instead
of a criticism on our present vague nosology would have been a
description of the various kinds of degeneration of the brain,
showing how the dementia paralytica which evidently results
is reached in as many and corresponding ways. At the present
time the great distinction is made between the mere imbecile
and him who has delusions which may be injurious to his friends.
The former dies peaceably at home, and the other is locked up
in an asylum.

As before said, the alienist takes charge of cases which are sent
him, or is asked to confer on cases where special mental symptoms
exist; but what I should like to do would be to place him

before all cases which show a tendency to loss of bodily and mental power, and request him to classify them. This is the position in which the general physician is placed. Not a week passes but he sees patients who die after an illness of two or three years, at last becoming quite helpless and childish, occasionally wasting, but often growing fat and flabby.

Some of these might, no doubt, be proved to be genuine cases of the general paralysis of the insane if they were further watched, but others show no characteristic symptoms of the disease. In one year in the hospital numbers of such persons pass through the wards, and I therefore give, in illustration of my remarks, an account of a few cases which have of late been under my care, but such instances might be increased indefinitely.

In Case No. 1 it will be seen that the man received an injury to his head which brought about a general paralysis, but he had no characteristic mental symptoms. In Cases 2, 3, and 4, there were the same paralytic symptoms, with failure of nerve power or absolute dementia, but no exalted ideas. In No. 5 there was no mental affection whatever, and in No. 6 there was a maniacal state without delusions. If cases of this kind are quiet they remain in a general hospital, if they are unmanageable they pass to an asylum. There may, however, be very slight pathological difference between them.

CASE 1.—*General paralysis, with maniacal symptoms, following an injury.*

J. J—, æt. 37, a carpenter, always had good health until two years ago, when he fell from a roof a height of fifty feet. He struck his head and neck, and was brought to the hospital, where he remained three weeks. It is not remembered whether he was stunned at the time of the fall, but if so it was only for a short time. After this he returned to his employment for six weeks, but soon found himself unable to continue it, and he then gave it up altogether. He had been gradually growing weaker in his limbs, and his mental faculties were very obtuse, so that on August 7th he was admitted into the hospital. He had been a well-made man, but was somewhat thinner; he was able to walk about the ward, but his gait was not very steady, his expression was vacant, and he spoke very slowly and hesitatingly.

He said he had sometimes lost the use of his speech for some minutes, and sometimes an arm or leg felt very weak. The left pupil was more dilated than the right, but both were small. He appeared to get a little better, so as to be able to go down stairs and walk in the grounds, and had not the same dejected manner as at first.

As regards his mental state, it was evident that his mind was torpid, but there were no symptoms to mark actual unsoundness ; he answered questions rationally when put to him, and could repeat the alphabet. He did this with much hesitation, his voice faltering, and his lips trembling. He did not read, but mostly walked about or sat a chair in a state of reverie. He occasionally was seen crying without any apparent cause, and on one occasion wept bitterly when he found he had gone to bed dressed. Dr. Bacon, of the Cambridge Asylum, was one day in the ward, and he stated that the paralytic symptoms resembled those of the general paralysis of the insane. After being in the hospital three months he went out.

He was readmitted nine months afterwards, and the report then describes him as a melancholy looking man, unable perfectly to articulate his words. He cannot read, as the letters dance before his eyes and his mind becomes confused. He at one time wrote a good hand, but now scarcely has control over his pen. The following are specimens of his writing on the two occasions of his abode in the hospital :

He complained of pains and weakness in his legs, but could walk tolerably well. During the following month his condition appeared to improve, although he was often complaining, stating that he was wasting away. He slept badly, and often wandered in his mind. He then became considerably worse in every respect; he was much depressed in spirits, sat in a chair talking

to himself, and often said that he was being poisoned. He was more feeble, and his gait unsteady when made to walk down the ward. Subsequently he became more troublesome, would not keep in bed at night, and tore his clothes to pieces. He was then removed to the strong room, and on one night was obliged to be restrained in bed. For some days he was constantly raving. When he became quieter his friends removed him. He was treated by tonics until the maniacal symptoms appeared, when he was ordered some tincture of cannabis, but it apparently had no effect. Subsequently, when very restless and having no sleep, he was ordered ℥ v of dilute hydrocyanic acid every hour, and after several doses was quieter. As his condition was so variable no conclusion could be arrived at as to the effect of the medicine.

CASE 2.—*General paralysis from injury* (?).

(Reported by Mr. G. A. COOMBE.)

Thomas M—, æt. 41, a slater by trade, is totally unfit to give any account of himself, and thus the following history has been obtained from his wife. As long as she can remember he has been a very healthy man, never having an illness of any kind until eighteen months ago, at which time he was at work at the roof of a house, standing on a scaffold, when he fell backwards six or seven feet, striking his back across a beam. He got up, however, and continued his work until the evening, apparently little the worse for his accident, only complaining of pain running up his back on stooping to pick up anything. Five months after this, after working all day in the sun, he was seized with headache and vomiting, which became so bad that he had to leave off work and go home. In the night he raved so much that she sent for a medical man, who gave him some pills which kept him in a comatose condition for three days. He recovered and was able to do some work for a few months, but was never thoroughly well again ; he had pain in the head and was giddy, so that he never could again ascend a ladder. About five months before admission he became much worse, as one evening he found his right arm completely numbed and feeble, and after some hours he experienced much pain in it. Subsequently he had several such attacks, at which time he clutched hold of his right arm, saying that he felt something

hard and heavy in the palm. During this time he has complained of pain at the back of the head, has been losing his memory and had difficulty in speaking. Latterly he has not been allowed to go out alone, as he cannot remember where he lives and loses his way; for although he has his name and address in full in his pocket-book, he has not the sense to show it to anybody. Lately, also, he has had a very ravenous appetite, sometimes asking for dinner immediately after finishing it, apparently forgetting that he has just eaten it.

On admission, the report says, he is a fine well-developed man, having a wild and excited look. He talks to himself, has a difficulty in pronouncing some of his words, and often, being unable to answer, will start off on an entirely different subject. When asked to repeat numbers he will do so and in any order, not apparently knowing what he is saying. When asked to write his name he assents, but the letters are shaky, and in a kind of mechanical way he places dots over the christian and surname. Sometimes he will laugh when spoken to, but generally the state of his mind displays no characteristic peculiarities; in fact, he is rather demented. When his wife and friends call he often fails to recognise them.

He remained in hospital a short time and was then removed.

Case 3.—*General paralysis with dementia.*

George B—, æt. 30. Was quite well until four months ago, when without any assignable cause he went out of his mind and was very violent. After three weeks the attack passed off and he resumed his work. Shortly, however, the symptoms returned, and his mind became quite lost. He would sit all day taking no notice of any one and not speaking, but he had not, as far as could be told, been the subject of any delusions.

There is no marked paralysis of any part, but there is a failure of expression and there is general feebleness of the whole body. His gait is tottering, and his hands shake when he raises his arms. He is quiet when lying in bed, but as soon as he moves a tremulousness comes over him. When asked to write he makes the attempt, and the strokes are made by a sudden jerk of the pen. During some days he sat quiet in his chair, and beyond saying " yes" and " no" did not speak. He then had a fit in which the face became livid, the left side drawn up, and

spasmodic twitchings of the limbs. After this he was delirious, especially at night, calling out, getting out of bed, so that the nurse was obliged to fasten him down. After a few days the attack passed off, and he was able to get up, and he soon after left. His bodily condition was one of universal failure of power, observed in his tottering gait, tremor of limb, hesitation in speech, and as regards his mind it was simply in a state of vacuity.

CASE 4.—*General paralysis of the insane with no exalted ideas*.

(Reported by Mr. FRANK TUCK.)

George K—, æt. 44, a baker. Was well until a year ago, when he began to get weak, and it was noticed that his voice trembled when he spoke, and that his memory was defective. He was better for a little while, but again got worse and quite incapacitated for any kind of work for four months. During this time he has been silent, has taken very little notice of anything, has never been at all violent, but was troublesome owing to the difficulty in keeping him in bed. He could walk for a short distance when supported, but if left alone he fell backwards. On one occasion when in bed his eyes became fixed and staring, and he trembled violently for about a quarter of an hour, but was not unconscious. A temperate man; had no exalted ideas during his illness.

A tall well-made man, with vacant expression of countenance; when asked a question he appears puzzled and seems to be trying to collect his thoughts; never speaks unless spoken to; and generally answers in monosyllables. He remains in bed nearly all day, taking no heed of anything passing around, but occasionally attempts to get out of bed and cannot be kept quiet unless his legs are tied down. When assisted he can walk for a short distance, and then in a shuffling manner on his heels. Passes his motions in bed simply from want of mental effort. The left pupil is smaller than the right. He could at one time write very fairly, but now grasps the pen feebly, and the letters he attempts to form are very shaky (specimen in report). As he was very dirty and began to eat his fæces, he was sent away.

CASE 5.—*General paralysis without mental symptoms.*

William K—, æt. 28.   A tanner and well until nine months ago, when he fell into a tan-pit, and on his return home his wife observed that he was not well.   He shortly lost muscular power, so that when he took up his cup his hand trembled, and would often upset it in attempting to put it to his mouth; at the same time his speech became so thick that his friends were unable to understand what he said to them.

On admission he was seen to be a stout well-developed man ; when told to put out his tongue he did so in a very tremulous manner; his speech was thick and he articulated slowly, and the lips trembled at same time.   He staggered when he walked, and the left pupil was more contracted than the right.

After being in the hospital a little time he very considerably improved; he spoke more distinctly, and he could walk up the ward without staggering, and his handwriting was not so shaky. He was in hospital six weeks and took fifteen grains of bromide of potassium three times a day.   His mind did not appear to be at all affected.

CASE 6.—*General paralysis with maniacal symptoms.*

(Reported by Mr. W. T. P. DOUGLAS.)

John H—, æt. 46, a lighterman.   No history of insanity in the family.   The account the wife gave of him is as follows :— She had considered him to be in perfect health up to a year ago, when he was suddenly seized with a kind of fit in which one side of his mouth was drawn up, and he was unable to speak distinctly, his speech being thick and articulation difficult.   This lasted only two or three minutes and left him apparently well, having been perfectly conscious throughout.   Shortly afterwards he had another attack whilst at his work, accompanied by a violent trembling.   He was taken home, and has not since resumed work.   For five or six months afterwards he had attacks almost daily, commencing with a sensation of lump in the throat, causing difficulty of breathing almost amounting to suffocation, and always accompanied by violent trembling.

It was afterwards said that for twelve months prior to the

first attack he had shown symptoms of failing mental power, since he could not be trusted in his work without supervision, but his wife does not seem to have noticed any change in his manners. For some months his limbs have become weaker, his legs more so than his arms, and this has been most evident in going up stairs, when he would make many efforts before he could lift his foot high enough; and of late his wife has had to go behind him to help raise his foot. For eight months he has had difficulty in retaining his water, and it would run from him if he did not pass it directly he felt the desire; he has occasionally had the same trouble with his motions. At the same time his speech has become thicker and more indistinct, with drawling of his words; he has become childish in his ways, and cries for money or articles of food. He has delusions, and thinks that policemen or soldiers are after him, and will run anywhere to get out of the way, and has also been continually haunted by some imaginary woman who he fancies has had a child by him. He has never had any exalted ideas.

When a boy he received a wound on the back of the head, which has left its scar. He also had a fall two or three years back and hurt the left side of his body and head.

He is a tall, strong-built, fine-looking man, expression vacant, and exhibits some want of trust in those around him. He appears to understand what is said to him, but his speech is thick and indistinct, and he hesitates some time before he makes answer to questions. There is no wasting of muscles, but they are flabby. He can give a fair grip with his hands, but there is much tremor in the arms when he holds them out, and his writing from being firm is shaky (specimen in report). Marked tremulousness of tongue when protruded. He was in hospital for some months, and at times appeared somewhat better, but finally he got out of bed at night, tore the curtains and acted like a madman, so that he was obliged to be dismissed. He took a scruple of bromide of potassium three times a day for five months and with apparent advantage.

ADHERENT PERICARDIUM

AS A

CAUSE OF CARDIAC DISEASE.

By SAMUEL WILKS, M.D., F.R.S.

THE following cases of death from adherent pericardium which have occurred in my practice at the hospital afford examples of a form of disease which is far from uncommon, although it has not received, I think, that attention which its importance demands. For if, indeed, such adhesions constitute one of the causes of cardiac disease the fact deserves more full recognition, since it affords an explanation of heart symptoms where the more ordinary and well-marked signs are wanting. I do not find, however, in turning to the standard text-books on medicine that mention is made of adherent pericardium as one of the causes which lead to impairment of the heart's action with the usual accompaniments of venous congestion and dropsy. I may more than others feel surprised at this, since I have known what they may not have been aware of, that the subject had been discussed in the pages of this work thirty years ago by two most excellent observers, and to their remarks I shall presently refer. Amongst modern writers who have considered the question of the importance of adherent pericardium, Dr. Hope states that he has never examined after death a case of complete adhesion of the pericardium without finding enlargement of the heart, generally hypertrophy with dilatation. This sufficiently demon-

strates the tendency of the affection, for its consequence is clear, he says, since the organ must increase in contractile energy in order to contend against the obstacle which the adhesion causes by checking its movements. Dr. Stokes, in commenting upon this, says that obliteration of the pericardium does not necessarily induce any manifest changes in the condition of the heart, or where alteration of the muscular condition of the heart is found in connection with this obliteration it is not necessarily a state of hypertrophy, but is often one of an opposite nature. I may say that my own teaching for many years has been that the simple pericardiac adhesions produce no visible ill consequences, and my judgment has been formed from the fact of their frequent discovery in persons who had died by accident or from other affections than those of the heart. At the same time I have been in the habit of showing how the results of a chronic pericarditis, displayed by a dense thickening of the membrane and by inseparable adhesions to the muscular tissue of the heart, do eventuate in cardiac disease. In preauscultatory times authors attached great importance to this condition. Thus, Morgagni mentions cases where patients suffered œdema of the lower extremities, abdominal and thoracic effusion, cough, &c., and these he found after death to be the subjects of complete obliteration of the pericardial cavity. Baillie also says that when the adhesions are close and have existed generally over the surface of the heart, the following symptoms have been observed, viz. a sense of oppression, difficulty of breathing, &c. Corvisart says, " Je pense que l'adhérence totale du cœur au péricarde est necessairement accompagnée d'un déréglement tel dans les fonctions de cet organe que la mort en est la suite inévitable plus prompte ou plus tardive."[1] Other writers have spoken in the same way, but as they have failed to mention clearly the state of the valves their opinion must be considered of little value, especially as at that time they had no knowledge of the auscultatory signs of

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[1] In one of the cases described by Corvisart as under his care in 1799 he mentions the operation of paracentesis thoracis which he had frequently performed, and also how he diagnosed the presence of fluid by means of percussion. It may be remembered that we are indebted to Corvisart for bringing Avenbrugger's researches on percussion before the profession. In the case above alluded to Corvisart says, " La poitrine ne résonnait point du tout à gauche quand on la percutait et la suffocation devenant instante j'ouvris moi-même la poitrine et il sortit aussitôt une quantité considérable de liquide."

valvular derangement.   It would probably be the experience of
most of the physicians of the present day that in the majority
of cases where patients have died of heart disease, and where
after death exceedingly tough pericardial adhesions have been
found, there have also been present the remains of an endocarditis
and valvular inflammation.   Still, I believe there do remain
some exceptional cases of heart disease where the pericardial
adhesion is the only morbid condition discoverable, and in which
we must therefore regard this as the cause of the symptoms.
Without any personal experience in the matter, no physician
could have felt any doubt of the importance of this affection if the
papers alluded to in these volumes had been as well known as
their interest deserves.   Two such good observers as Dr. Chevers
(now of India) and the late Dr. Barlow must have left the
matter beyond all doubt.   Neither of these gentlemen had for
his special object the investigation of the effects of pericardial
adhesions.   The one was considering the changes which take
place in the apertures of the heart, and the other the conse-
quences of contracted chest; but they both arrived at the con-
clusion of the importance of universal adhesion.   Dr. Chevers
considered it to be a cause of atrophy and strangulation of the
heart, thus leading to its impairment and the usual cardiac
symptoms, whilst Dr. Barlow believed the adhesions interfered
with the action of the respiratory process, and thus led up to
the same cardiac symptoms which Dr. Chevers had described.

Dr. Chevers refutes Dr. Hope's opinion that pericardial ad-
hesions lead to enlargement of the heart, showing that they have
rather the contrary effect—that obliteration of the cavity tends
to cause diminution of the heart and great vessels. He believes
that in Dr. Hope's cases there must have been superadded some
valvular disease, since he had observed a sufficient number of
cases to prove that where the valves are healthy a complete and
close adhesion of the pericardial surfaces, so far from producing
hypertrophy and dilatation, has a tendency to be followed by
general diminution of the size of the heart and its vessels, and
contraction of its cavities.   He then gives three cases where
patients suffered from dyspnœa and dropsy and all the usual
symptoms of heart disease. In these the pericardium was oblite-
rated by a layer of (so-called) cartilaginous deposit; the heart
was small, all the cavities were diminished in size, the walls thin,

and the aortic orifices lessened in calibre. Dr. Chevers believes that the layer of adhesive matter which has been deposited around the heart compresses its muscular tissue and embarrasses both systolic and diastolic movements, but more particularly the latter. Although for a time the vessels adapt themselves to the cavities from which they arise, and blood passes for a time with tolerable freedom, yet before long the heart becomes encumbered and embarrassed, distension of the veins follows and the resulting dropsy. To confirm his statements of the effects of adhesion on the heart Dr. Chevers proceeds to say that from a careful examination of all the cases which had occurred in the hospital during seven years, there had been no case of hypertrophy with dilatation of the heart occurring in combination with long-standing obliteration of the pericardial cavity, in which there was not also present either morbid narrowing of the aortic or mitral orifice ; in other words there were the usual valvular causes present to produce the enlargement.

With regard to Dr. Barlow's views, this physician had in his ' Gulstonian Lectures' offered an explanation of a class of cases which are not infrequently met with in early youth—cases of fatal dropsy from obstruction in the chest where the right side of the heart is found enlarged, the lungs healthy, but the chest small. His interpretation of them is that, owing to a contraction of the chest arising in infancy, there had been want of due expansion and growth of the lungs, and that when adolescence was reached the right side of the heart became enlarged, accompanied by a venous engorgement and dropsy. He shows how in connection with the diminished volume of lung the trachea is small, the left cavity of the heart reduced in volume, and at the same time the mitral and aortic orifices are reduced in size to accommodate themselves to the diminished stream of blood issuing from the pulmonary veins. Dr. Barlow had observed the same train of symptoms in cases of young persons where the pericardium was universally adherent, and thus they do in results not seem to differ from those alluded to by Dr. Chevers, although Dr. Barlow puts a different interpretation upon them. He would not deny that the cartilaginous adhesion of the pericardium tended to atrophy of the heart by strangulation, but in some of his cases the right side was enlarged, and therefore he explained the chain of phenomena by supposing that the peri-

cardial adhesions impeded the free motion both of the ribs and diaphragm, but more especially of the latter, and that thus arose a hindrance to free respiration and a resulting recoil on the right side of the heart, tending eventually to venous obstruction, dropsy, and death.

Here we see two physicians who had occupied much thoughtful labour on the subject agreeing that pericardial adhesions, if of a tough nature and closely embracing the heart, and especially if occurring in young persons, tend to obstruction of the circulation and inevitable death. The one, however, believed that the direct constriction of the heart was sufficient to produce the result, as he found the heart atrophied and vessels narrowed. The other believed that, although the tendency of such adhesions was to cause atrophy, yet, the right side being found enlarged, they acted injuriously, only mediately, through the impediment they opposed to the respiratory movements. A perusal of the essays of these two physicians, with their carefully selected cases, can leave no doubt as to the importance of this form of pericardial disease, but even at the present day the question is still asked, are pericardial adhesions of any importance, or not? The answer probably is, that the loose cellular adhesions have no appreciable influence on the action of the heart, but that the thickened pericardium of a cartilaginous consistency investing the heart closely, arising from an inflammation at an early period of childhood, does lead to obstruction of the circulation, and then to dropsy, after the ordinary manner of heart disease. Such cases, where no valvular imperfection exists, are most difficult to diagnose, and, therefore, are of great clinical as well as pathological interest; the first case, presently to be described, was under the care of all the physicians of the hospital in turn, and a correct opinion of its nature was never formed.

The cases where firm adhesions are found in combination with various other structural changes in the heart are very common, but their importance sinks into the shade by the side of the deranged mechanism of the valves. We know that in consequence of an inflammation of the heart all its tissues may be involved, and that a pericarditis, a myocarditis, or an endocarditis, may result. To the latter we attach most importance, since it deranges the valves, and their altered action can be discerned

by the ear during life. Also an inflammation of the muscle is by no means uncommon. In acute pericarditis there is frequently observed a layer of muscle beneath the inflamed surface having an unhealthy colour and consistence, and, as a result of its implication, we may find in after years an actual streaking of the muscle, with adventitious fibrous material, or, as a simple consequence of the softening which occurs during the inflammation, a dilatation of the cavities.

But quite lately a boy died under my care with enlarged heart. The pericardium was slightly adherent, showing that an inflammation had occurred during his rheumatic attack, and the dilatation of the cavities was, no doubt, due to an implication of the muscular tissue during the same period. Then, just as an endocarditis or myocarditis may lead to future mischief, so may a pericarditis. It is well, therefore, to look at every one of the three forms of inflammation separately, and then we can be better prepared to give to each its due share in the production of the fatal symptoms when we meet with them combined. And this is not always so easy a task. Thus, in these cases of adhesion it may not be so much the constrictive force which has acted injuriously on the heart as the fact of the muscular tissue having become involved in the inflammatory process, just as in the analogous case of the lung, where in one case the organ may be found enveloped in an enormously thick cartilage-like pleura, and in another in association with this the lung itself may have become included in the inflammatory process, and undergone the change known as cirrhosis. Still, should the muscular wall altogether escape, there can be little doubt that these tough pericardial adhesions, when occurring at an early period of life, do impede the heart's action, and in all probability its growth. It may be that the position of the adhesions may cause a difference in this respect, and thus the result vary according as one portion or another is bound tight. As a rule, the greatest thickening is in front, so as to affect the right auricle and ventricle.

I would especially draw attention not only to the fact that the chronic inflammatory process very often involves the vessels entering the heart within the pericardium, but that when the latter is adherent the thickening and induration proceeds, as would a growth, to involve the cellular tissue in the medias-

tinum, and even, creeping upwards, to surround the veins in the neck. I have thus seen, in two or three cases, a tough areolar tissue surrounding the vena cava and brachio-cephalic veins in connection with an old pericarditis.

In any particular heart where tough adhesions exist, and at the same time valvular disease, with an alteration in the cavities of the heart, we can only set the right value on each of these conditions by having previously studied the effects of them separately.

I give six examples of cases where death was due apparently to adherent pericardium, and in looking through our post-mortem records I find that I might have added two or three more from every annual return. Therefore the condition can-not be regarded as being a rare one. A perusal of these cases would almost incline me to offer the proposition that in a well-marked case of disease with cardiac symptoms in young persons without any valvular bruit pericardial adhesions may be fairly expected. In older persons, of course, we should look rather to degeneration of muscular tissue.

CASE 1.—Alfred P—, æt. 21, a cooper by trade. He ap-peared to have been ailing from boyhood, although there was no history of any distinct illness. He used to get short-breathed, livid in the face, and his hands became blue and cold. When a boy about twelve years old, he could not run without getting out of breath. About three years before his death all these symptoms became aggravated; on exertion his breath became very hurried, and at the same time his face, hands, and surface of body became blue and cold. He very often had epistaxis, which gave him considerable relief. Occasionally his ankles would swell. All these symptoms were more severe in the cold weather. During these three years he was several times in the hospital, and came under the notice of all the physicians in turn. He entered when the symptoms were aggravated, and this was mostly in the cold weather, and when relieved he again left. At this time his body had a puffy appearance, his neck was swollen, the skin of the body often slightly œdematous, and a small amount of fluid in the abdomen. The whole surface of the body was of. a livid hue, observed more especially in the extremities and in the face, more particularly the lips. His

face, hands, and feet, were also cold. The veins on the body were prominent, both on abdomen and chest, and the legs were covered with small varicose veins. His breathing was very difficult, obliging him to sit up in bed. On examination of the heart the sounds were more obscure than natural, but no bruit was discoverable in any part. The action was often irregular. Liver much enlarged. After taking the usual cardiac medicines, more especially digitalis, to quiet the heart and act on the kidneys, he considerably improved, so that he left his bed and walked about the ward. The diagnosis was some congenital affection of the heart. After leaving the hospital and remaining tolerably well, he again came in with the same symptoms; orthopnœa, blueness of face and hands, and general coldness of the surface. He took digitalis again, and had his usual epistaxis, and was much relieved thereby. Whilst in hospital, owing to sudden setting in of cold weather, his breathing became most difficult, and the blueness with enlargement of veins most remarkable. He, however, again got relief and left the hospital. On the last occasion his symptoms had become more permanent; the lips were blue, the hands of a dark purple colour and cold; the legs anasarcous, and the abdomen contained considerable quantity of fluid; veins over the body distended; could only breathe in upright posture. His heart was repeatedly examined, and no bruit was discoverable. He was tapped to several pints and much relieved. The fluid soon collected again, the breathing became more difficult, and the blueness of body still more increased, and so he died. As before said, he was in hospital several times, and for months under all the physicians of the institution in turn. They repeatedly examined his heart and could find no evidence of disease. The long duration of the symptoms precluded the possibility of the presence of a growth involving the heart or great vessels, and thus the universal opinion arrived at was that the disease was congenital, and under this name it was entered in the hospital books. Only one physician ventured an opinion as to the exact nature of the malformation, and that was an open foramen ovale. This opinion was not shared by others, seeing that this condition is most usually associated with other abnormal changes and would have been accompanied by a bruit.

Post-mortem examination.—Body universally dropsical; in

right side of chest there were two pints of fluid. The left lung adherent to chest; both lungs adherent to pericardium. The pericardium universally adherent to heart, immensely thickened, especially at 'the right side, where the right auricle and ventricle had over them a plate of ossific deposit. The pericardium was so closely incorporated with the muscular tissue that the two could not be separated without laceration. The heart was enlarged and altered in shape. This was especially due to enlargement of the two auricles, each of which was at least double the normal size. The dilatation of the pulmonary vein on one side and the vena cava on the other added to their large dimensions. The right auricle was firmly adherent to the lung behind and to the pericardium in front. The vena cava inferior distended in its passage through the diaphragm, and at its entrance into auricle. This seemed to be due to the distension which it had undergone. The opening of coronary vein of immense size. Fossa ovalis depressed; membrane thin, and at edge a linear opening, but this acted as a valve, and thus probably no blood passed through.[1] The left auricle larger than natural, but less than the right. The two ventricles of normal size, or, perhaps, somewhat smaller. Pulmonary artery of normal size; muscular coat of heart thin, pale, and flabby. Tricuspid, mitral, and aortic valves quite healthy; trachea rather small; liver nutmeg; spleen and kidneys healthy.

CASE 2.—Edgar K—, æt. 9. He had always been a sickly lad. Had never had rheumatism, but scarlatina three years ago. Before he was admitted to hospital he had been suffering for six weeks with all the symptoms of heart disease, such as difficulty of breathing, dropsy, &c. His abdomen was distended; the liver could be felt much enlarged; the legs were anasarcous, and he had considerable difficulty in lying down; his favorite position in bed was on his hands and knees. On examining the heart much surprise was felt at hearing no bruit, the sounds appearing natural. The pulse was small and usually about 100,

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[1] Those who have not made many observations on the dead are scarcely aware how frequently an opening remains through which the handle of the scalpel can easily be passed. It is usually valvular, and does not allow of the passage of the blood. If an opening has been suspected such a condition has been looked upon as confirmatory of the diagnosis, but it is quite unimportant.

and respiration 56. He took the usual remedies for cardiac dropsy and obtained considerable relief, so that he was able to leave his bed and lie down at night. He subsequently became worse as regards his breathing, so that when sitting up he preferred hanging his arms over a table. He afterwards had more difficulty in breathing, and his face became livid, in fact sometimes it became quite blue. No cardiac disease could be discovered, and it was thought that there must exist some growth causing pressure on the larger vessels.

The post-mortem showed a universally adherent pericardium ; the latter was much thickened by adventitious inflammatory matter, which also closely surrounded the roots of the vessels. The pericardium, together with the false membranes, was as thick as the walls of the heart, the outer layers being toughest and the inner softest, as though the inflammatory process had gone on from without to within. The left ventricle rather thin and small, but muscle good ; the right ventricle where the pericardium was thickest and most adherent had its walls infiltrated with fibrous material, and the right auricle in like manner had its walls indurated. The vena cava and veins in neck were not encroached upon. The valves were quite healthy ; liver nutmeg.

CASE 3.—*Reported by Mr. Wm. Stanger.*

Alfred H—, æt. 12, admitted under Dr. Wilks, February 11th, 1870, was tolerably well until a few months ago, when after a cold he suffered from cough and difficulty of breathing. Subsequently some swelling of the abdomen and of the legs appeared. There was no history of rheumatism, nor any chronic affection. On admission the lad had considerable dyspnœa, and his face was livid ; the legs were anasarcous, and the abdomen fluctuated with some fluid. The liver could be felt considerably below the ribs. There were some mucous râles in the chest, and he had a cough. The heart sounds were normal. Urine not albuminous. In the absence of any signs of cardiac disease and of any chronic affection of the bronchial tubes, there was some difficulty in forming a diagnosis, and it was conjectured that the case might be one of those which Dr. Barlow had described, where, from want of due expansion of lung in infancy, and con-

sequent diminution of the thorax, the circulation through the chest was impeded, and thus the dyspnœa and dropsical symptoms. He took diuretic medicine and was considerably relieved, so that he was able to leave his bed. Subsequently the dropsy increased in abdomen and legs, and the dyspnœa and lividity were aggravated. There were some bronchial râles, but no other indication of pulmonary disease, and the sounds of the heart remained natural. He varied from better to worse until commencement of May, when the fluid in the abdomen had increased to such an extent as to give him much distress, and he was accordingly tapped and 190 ounces of fluid drawn off. This gave him much relief, so that he was able to leave his bed again and walk about. The abdomen gradually refilled, and in about a month's time the abdomen was as large as before, and at the same time the scrotum and legs had become very anasarcous. He was, therefore, again tapped, and 230 ounces of fluid removed. He never rallied after this, but died three days afterwards.

The post-mortem examination showed recent peritonitis. The lungs were healthy. The pericardium was universally adherent, so as to be quite inseparable from the structure of the heart. This was especially so in front and over the right auricle, where the thickened pericardium and muscle were incorporated. The organ was about the usual size. The valves quite healthy. The lungs universally adherent to chest-walls and pericardium. The liver enlarged and nutmeg.

CASE 4.—Amelia C—, æt. 16. When quite a child had rheumatism, and had suffered occasionally from dyspnœa ever since, and other symptoms indicative of heart affection. She had, however, been able to follow her employment until a few hours before admission, when being taken much worse she came to hospital. She survived only a few hours. There was much dyspnœa, but no bruit to be heard.

On post-mortem examination the immediate cause of death was seen to be congestion of the lungs with some recent pneumonia. Both lungs were universally adherent to chest-walls, and closely embraced the heart, to which they were adherent. The pericardium was closely attached to the heart, especially in front, where it formed a close union with the muscle of the right ventricle. The heart rather dilated in all its cavities.

The left auricle large, and the walls thick. The left ventricle had its walls thin, especially at the apex. The pericardium was very thick and encroached on the muscle, especially that of the right ventricle, whose walls were closely incorporated with the membrane and new tissue, leaving muscular layer very thin. The muscle of heart throughout pale and soft. Endocardium did not show any marked signs of ever having been inflamed, but the edges of the mitral valve were slightly thickened. It appeared, however, to be an efficient valve.

Case 5.—Alfred L—, æt. 26. He was taken into the hospital in a very exhausted state; the dyspnœa was excessive and coming on in paroxysms, so that it seemed at any moment he would die. His face and hands were blue and cold. The heart was violently beating against the chest, but no bruit could be heard; the natural sounds were indistinct. He had been in the hospital a year before with what was believed to be a heart affection, though no abnormal cardiac sounds were detected, but the natural ones were described as obscure. He then had some dropsy, which afterwards disappeared. On this second occasion he died soon after admission.

The post-mortem examination showed some slight œdema of the legs; a little fluid on the right side of the chest. Pericardium universally adherent, much thickened, and indurated; it was a quarter of an inch thick in all parts, but at the base anteriorly it was still thicker, and the tissue so tough that the adventitious matter felt more like a tumour. It encroached on the muscle of the auricles, and proceeded upwards along the aorta and the roots of the blood-vessels coming from the arch. Thus the trachea, aorta, mediastinum, &c., were all involved in one hard, tough, fibrous tissue. The heart was enlarged in all its parts. The endocardium showed no trace of any previous inflammation, and the valves were quite healthy. The pericardium also firmly united externally to both lungs. Liver large and myristicated.

Case 6.—John D—, æt. 24. A caulker at Woolwich. For many years had had a cough, shortness of breath, and expectoration. There was a history of rheumatism several years ago. He was in the habit of coming to London for medical advice, and on the day of admission, the weather being cold, was unable

to return. His breathing was extremely difficult, and his face was livid. He was bled to the amount of a few ounces, and this gave temporary relief, but he died a few days afterwards. No abnormal sounds were heard to indicate disease of the heart.

On post-mortem examination the lungs were found universally adherent to chest and pericardium. They were extremely congested, and in parts the blood was extravasated into the tissue. The bronchial tubes were slightly dilated, and contained mucus. The pericardium was universally and closely adherent to heart, and unable to be separated without the tissues of the heart being torn. It was also much thickened. The left ventricle of usual size, the right hypertrophied, and walls thickened and tough. The mitral valve quite healthy. The aortic valves efficient, but on their surface a few minute vegetations.

NOTE

HISTORY OF VALVULAR DISEASES OF THE HEART.

By SAMUEL WILKS, M.D., F.R.S.

HAVING on several occasions lately seen allusions in medical writings to questions affecting the priority of discovery of the more important lesions of the heart, especially those known as aortic regurgitation and mitral obstruction, I beg leave to offer the following observations on the subject. And first as to disease of the *aortic valves*. Laennec taught that the first sound of the heart accompanied the systole of the ventricles, and the second accompanied and was caused by the contraction of the auricles. When the subject of auscultation began to be discussed in this country, some of the leading men formed themselves into a Committee in order to investigate afresh the causes of the heart's sounds, and the bruits attendant upon disease of the valves. They were not all of one accord as to their nature, and slightly different views were maintained by writers of that period. Amongst others was Dr. Hope, whose book obtained deserved celebrity, and whose views may be regarded as those current at that time. In his work on diseases of the heart, published in 1832, Dr. Hope, in speaking of the natural sounds of the heart, says the first sound is caused by the systole of the ventricles, and the second sound is occasioned by the diastole of the ventricles. As regards the morbid sounds accompanying disease of the aortic valves, he by no means had a clear conception of the effects of regurgitation into the ventricles and of the marked bruit which accompanies it, but this is to be explained by his mistaken views regarding the cause of the second sound. "When the aortic or

pulmonic valves are contracted a morbid murmur accompanies
the sound of the ventricular systole, and when the valves, not
closing accurately, admit of regurgitation a murmur accompanies
the sound of the ventricular diastole also, but in the latter case
it is extremely slight and brief, because, as I imagine, the swift
influx of blood from the auricle during the diastole almost in-
stantly puts an end to any regurgitation capable of producing
sound." "*Signs of disease of the aortic valves.*—One of the
murmurs above described is heard during the ventricular contrac-
tion about the middle of the sternum, and is louder here than
elsewhere. When a murmur of this kind is louder along the
tract of the ascending aorta than opposite to the valves, it pro-
ceeds from disease of that vessel. A murmur may accompany
the second sound when there is regurgitation through the aortic
valves, and its source may be known by its being louder and
more superficial opposite to the valves than elsewhere. I have
never found it strong, and doubt whether it can be so, as the
instantaneous manner in which the ventricle is refilled by its
diastole must prevent the regurgitation from being considerable."
I think there can be no doubt that Dr. Hope's mistake lay in
confounding together the two sounds of the heart, for when we
consider that a single very loud diastolic bruit constantly occurs
in connection with regurgitation through the aortic orifice, and
is heard best over the sternum, it must have been this which he
detected and confounded with the systolic. Subsequently it
would seem that Hope, with others of the committee, thoroughly
appreciated the fact of a loud diastolic murmur with imperfection
of the sigmoid valves. That the subject, however, was then ill
understood is clear from the fact that credit is at the present
day chiefly given to Dr. Corrigan for a thorough explanation of
the bruit and pulse which result from aortic regurgitation.
Thus, at some medical schools, both in England and in France,
the pupils hear the characteristic aortic pulse spoken of as
" Corrigan's pulse." His original essay, styled " Inadequacy of
the Aortic Valves," was published in the ' Edinburgh Medical
and Surgical Journal ' for April, 1832. Therein he insists on
three points as characteristic of this affection—a bruit de soufflet
heard in the ascending aorta and carotids, frémissement in the
larger vessels, and visible pulsation in the arteries. The latter
he attributes to the permanent distension of the vessels from the

incapacity of the aorta to contract, owing to the incompetency of the valves ; the bruit de soufflet and frémissement are due to the dilated vessel, and these he regards as systolic. He states that when the valves are much diseased there is a double sound from the blood flowing back, but he clearly regards with Hope the main sound as systolic, and this idea is more evident when he speaks of the possibility of distinguishing it from a mitral bruit by its being heard at the base rather than the apex. Corrigan then more fully describes the pulse, dwelling upon its throbbing nature and visibility in the smaller arteries. He does not, however, lay so much stress on its collapse or retrocession as he does on these other two qualities.

It is very remarkable that five years before this Dr. Hodgkin had given a far better account of the diseases of the valves and the morbid sounds than was to be found in any of the systematic works on medicine. Thus, in February, 1827, he read before the Hunterian Society a paper on retroversion of the aortic valves, which is published in the ' Medical Gazette.' He commenced by stating that no mention had been made of the disease by Corvisart, Laennec, Rostan, Bouillaud, Andral, and others, and then goes on to speak of cases where the valves had become inefficient, and allowed the blood to flow back into the heart. He then alludes to the great enlargement which ensues, and of the " bruit de scie " heard during life. Amongst other cases he describes that of his friend Dr. Cox, a young man who had been travelling physician to Sir R. K. Porter, and had indulged much in rowing and athletic exercises, besides being a fleet runner.

Dr. Hodgkin says that, on examining him, he found inordinately violent arterial action, and a remarkable thrill in the pulse, which was regular. The heart's action was accompanied by a " bruit de scie," which was double, accompanying the systole as well as the diastole. He exhibited the heart to the Society, which was much enlarged, and one valve was elongated and hung down towards the ventricle. (Specimen now in Guy's Hospital Museum, No. 1427[60]). He then remarks on the nature of the double bruit, that it was owing to the blood being subject to two motions, the one progressive, the other retrograde, in both of which it might easily give rise to some sound as it passed the elongated valve. The peculiar thrill which was observed in the

pulse may be ascribed, he continues, to the interruption of the progressive current, which must have taken place whenever the elongated valve passed its more healthy fellows as it was carried from ventricle into aorta. It must thus be admitted that, unless any other writer can be quoted on the subject, Dr. Hodgkin had a far deeper insight into the matter of aortic disease than any other man in the year 1827. It will be seen, however, that he does not any more than other writers at that time thoroughly appreciate the true character of the pulse. He speaks of its peculiarity being due to the elongated valve thrown forward into the current of blood, not knowing that the most extreme form of the pulse described would be found where the aortic valves were altogether deficient. The idea of collapse from the want of sustainment of the blood by the aortic valves does not seem to have occurred to any writer of the time.

Now, as regards the *mitral orifice* and the question of its narrowing and accompanying bruit, it is very difficult, I think, to offer an opinion as to who deserves credit for having afforded a true explanation of the circumstances attending them. Thus, Laennec himself and his immediate followers believed that the blood passing through a contracted mitral orifice produced a bruit. They considered that abnormal sounds were mainly due to contracted orifices, and thus in all simplicity believed that if a bruit had been heard during lifetime over the heart, especially in one particular region, and that after death the mitral surface was found narrowed, the sound had been caused by its passage through this constricted channel. It is remarkable how this simple view came to be discarded, but for what reason is not very clear. It is generally supposed to have been due to the want of knowledge of the action of the heart; but this cannot be so, for the opinions now held, and which explain all the circumstances of the presystolic bruit, were then clearly set forth by the various Heart Committees. It does not seem very evident why the earlier opinions were so soon put aside, but I can say for myself, that whilst accepting the more modern doctrines of the schools, I felt a confidence in the opinion that the narrowing of the left auriculo-ventricular orifice was instrumental in the production of the bruit, for on examining a heart after death, and finding this condition associated with an enlarged and hypertrophied auricle and a small ventricle, there

could remain no doubt as to the direction in which the impediment had occurred, and thus one could not but believe that the bruit which was heard during life was produced during the passage of blood from auricle to ventricle, and at the same time feel reluctant, with such evident cause, to comply with the opinion that the bruit was systolic, and produced by the regurgitation of blood backwards. I am under the impression that the physician to whom we are indebted for elucidating this subject in modern times is Professor Gairdner, of Glasgow. Bringing together a correct estimation of the time when the bruit occurred, and our knowledge of the action of the heart, the problem was solved. I apprehend it was a forgetfulness of the facts which had been seen by the experimenters' own eyes, and their clinging to the notion that the second sound was due to or occurred during the systole of the auricle, which led them into error, for this belief caused them to seek for the direct mitral or auricular murmur at the time of the diastolic or second sound of the heart. Now, as an apex murmur was not often heard at this time, but the opinion was still practically held that the auricular contraction was synchronous with the second sound, the idea of an auricular murmur was discarded, and nearly all apex bruits were regarded as regurgitant mitral. I think it is very clear that until quite lately we allowed these same erroneous impressions to take us away from facts which seemed so obvious to the first observers. If a heart be found in the condition mentioned, with a narrow auriculo-ventricular orifice, and the auricle behind it immensely hypertrophied, there can be only one conclusion as to the direction of impeded flow, and, therefore, the cause of the bruit which existed during life. The answer is now fully given, that under these circumstances a bruit does occur during the contraction of the auricle, and is presystolic. The bruit, however, may not be altogether auricular, but cover both the pause and the second sound.

To suppose, however, that the earlier auscultators knew nothing of the direct mitral murmur is a mistake, for they believed the mitral murmur was mainly due to narrowing, and it was their immediate successors who controverted it and established another doctrine, viz. that in nearly all cases of diseased mitral valve the bruit was due to regurgitation through it. Dr. Addison, of this hospital, never distinguished a presystolic bruit

from a systolic one, and openly taught that he was quite unable to diagnose a contracted auriculo-ventricular orifice from a dilated one. Laennec, whom we may regard as the earliest writer on the subject (as it was probably he who first discovered the morbid sounds of the heart, though Corvisart had observed the frémissement which often accompanies them), says, in speaking of the contracted mitral orifice, " the bellows murmur is a much more constant sign ; it accompanies the contraction of the left auricle when the mitral valve is affected, and that of the ventricle when the induration is in the sigmoid. When the sound of the bellows, rasp, or file, persists in the auricle, either continuously or interruptedly, for several months, when it is found only there and exists even in the greatest quietude, when it is scarcely lessened by venesection, we may be assured that the auriculo-ventricular orifice is contracted. If the same phenomena occur under similar circumstances in the left ventricle, we may be equally certain that the aortal orifice is contracted." Laennec exemplifies this by a case of a young man who, amongst other symptoms, presented the following :—" The hand applied over the region of the heart feels the pulsation strongly, and accompanied with the purring vibration ; the stethoscope applied between the cartilages of the fifth and seventh ribs gives the following results : —Contraction of the auricle extremely prolonged, accompanied by a dull but strong sound, exactly like that produced by a file ou wood. This sound is attended by a vibration sensible to the ear, and which is evidently the same as that felt by the hand. Succeeding this a louder sound, and a shock synchronous with the pulse, point out the contraction of the ventricle, which occupies only one fourth part of the time. From these signs the following diagnosis was given—ossification of the mitral valve, slight hypertrophy of the left ventricle." It is very clear that Laennec regarded the bruit which accompanies the contraction of the mitral valve as direct and not regurgitant, and, therefore, as occurring during the auricular systole. His error was in not appreciating the exact time at which this occurred. One point alluded to in the above case is of interest, as it has not yet been clearly elucidated, and that is his referring the prolongation of the bruit to the slower contraction of the auricle. It was known in Laennec's time, as at present, that the contraction of the auricle was sharp and short, almost as the twinkling of the

eye, and that it is accompanied by no sound; and thus it is still a question whether the prolonged presystolic bruit which occurs in narrowing of the mitral orifice be due to the slower contraction of the auricle in consequence of its hypertrophy and the obstacle it has to overcome, or whether it be owing simply to the fact that we hear the blood pouring in from the veins during the diastole of the heart and the pause. This is a question still under consideration. That the earlier writers on heart disease were of the same opinion as Laennec can be shown by a reference again to Hope, who says, " when the mitral valve is contracted a murmur accompanies, and sometimes entirely supersedes, the second sound, being occasioned by the obstructed passage of the blood from the auricle into the ventricle during the diastole of the latter. When the valve, not closing accurately, admits of regurgitation, a murmur accompanies the first sound. This fact was one of the very few overlooked by that wonderfully accurate observer Laennec." This last remark,— that Laennec had not observed a regurgitant mitral murmur,— clearly shows what the nature of his teaching was, and confirms the statement made from his own work that he attributed the bruit which occurred in cases of mitral contraction to direct impediment, caused to the flow of blood during contraction of the auricle. Hope says in another place, " *Signs of disease of the mitral valve.*—When this valve is contracted the second sound loses on the left side its short, flat, and clear character, and becomes a more or less prolonged bellows murmur. When the valve is permanently patescent, admitting of regurgitation, the first sound likewise is attended with a murmur." He then gives cases in which it is clear that he regards a bruit with the second sound as indicating contraction of the mitral orifice. In one of these, which he describes as being due to contraction of the aortic and mitral valves, he says a prolonged bellows murmur accompanied both sounds, and he accordingly diagnosed disease of both valves. " The murmur accompanying the second sound resulted from the contraction of the mitral to half its size." After the lapse of a few years this view was given up, and apparently because it did not coincide with the opinions held with respect to the action of the heart. This certainly is very remarkable, because its action appeared to be understood as at the present day. Thus, Hope gives an account of the experi-

ments made before himself and the Heart Committee, and in reference to the action of the auricle says, " that in small animals the auricular systole took place immediately *before* the ventricular, and not *after*, as supposed by Laennec, I regarded as certain, both from the evidence of my own experiments and from the concurrent testimony of the old physiologists. That the second sound did not depend on the auricular systole was indubitable, because the one was prior and the other subsequent to the ventricular contraction. (The second sound due to diastole of the ventricle.) The auricles contract so immediately before the ventricles that the one motion is propagated into the other almost as if by continuity of action, yet the motion is not so quick that it cannot readily be traced with the eye." Hope then gives as a summary the following order in the rhythm, and this is the same, I believe, as is taught at the present time:— " 1. Auricular systole. 2. Ventricular systole, the impulse and pulse. 3. The ventricular diastole. 4. The interval of ventricular repose, towards the termination of which the auricular systole takes place." It does seem remarkable with a knowledge of the action of the heart and the belief in a direct mitral murmur, that the exact time of its occurrence was not correctly fixed. It must have been the governing influence of Laennec's views over their minds which made these good observers forget what they had seen with their own eyes, so that, when standing before a living patient, they associated auricular systole with the second sound of the heart. It is also very remarkable when some years later this view was found to be erroneous, and the true nature of the second sound was discovered, that instead of physicians simply correcting the fault, they swept away the whole idea respecting this direct mitral bruit. At least this is what, for the most part, occurred, and the teaching of the schools was that all mitral and apex bruits were of a regurgitant nature. It is a recent revival to speak of direct mitral bruits, although, with our knowledge of the heart's rhythm as given above, contraction of auricle, ventricle, and aorta, it would seem to have necessitated presystolic, systolic, and diastolic murmurs whenever an abnormal sound is produced during the closure of their several cavities. A direct mitral bruit, however, may probably occur, not only during the contraction of the auricle, but also during the heart's diastole and pause.

ON

SYPHILITIC DISEASE OF THE SPINAL CORD.

By W. MOXON, M.D.

An exact knowledge and a general recognition of the importance of syphilis in causing spinal paralysis are much to be desired. In our highest class text-books, such as Dr. Russell Reynolds's 'System of Medicine,' we find no direct mention of a syphilitic disease of the cord, although hæmorrhage, tubercle, and tumour of the cord, and other diseases of it which, equally with syphilitic disease, are not proper to it especially, have their separate allotments of notice.

The chief interest of the relation of syphilis to spinal disease is thrown into the question whether syphilis has any influence in producing locomotor ataxia. I shall not enter into this question, except to say that the five inspections I have made in cases of locomotor ataxia showed only, as usual, the well-known *sclerosis*, or grey induration of the posterior columns. This change has in it nothing characteristic of syphilis,[1] though in

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[1] In Lancereaux's work (Syd. Soc. trans., vol. ii, p. 86) is the following:—"To these lesions of medullary syphilis might we not add certain cases of grey or amyloid degeneration which, in a symptomatic point of view, find their expression in ataxy of the movements of the lower extremities? . . . . It is allowable to suppose that the syphilitic diathesis may have an influence upon the amyloid degeneration of the spinal cord, analogous to that which it exerts upon the waxy degeneration of the liver and some other organs." But it must be noted, first, that syphilis does not exert an influence upon the amyloid liver, it creates it; and, second, that there is no connection between this disease and the grey amyloid degeneration of the cord. The latter change is due to the presence of corpuscles, like starch-corpuscles in their character, and which are normally present in the *neuroglia* and *ependyma ventriculorum* of the brain in advancing years, so that the presence of

the testis, and in lung and liver probably, a diffuse induration which, *mutatis mutandis*, is of an equivalent nature, is ascribed by some to syphilis rather doubtfully, so that in default of evidence from morbid anatomy we must depend for evidence of the possibly syphilitic nature of locomotor ataxia upon such associations of the disease with syphilis as can be made out clinically.

This sort of evidence from association is capable rather of creating conviction in the mind than of affording proof which shall test the truth of the conviction. The grey degeneration does unquestionably occur in the cord in the absence of syphilis, while, on the other hand, locomotor ataxia is rare in syphilis, to say the least of it. And hence the *opinion*, not to say the *knowledge*, that syphilis in some instances causes it, requires for its verification an extended observation proving a greater frequency of its occurrence in syphilitic than unsyphilitic persons, or else a series of convincing instances of supervention of ataxia among other syphilitic accidents. Even were it shown that the syphilitic more frequently have locomotor ataxia, and that syphilis often notably precedes or accompanies ataxia, it then remains to show that such greater liability of syphilitics to ataxia is not due to the more common occurrence of ataxia in a class of persons who, for altogether other reasons, chance to include more syphilitics than the average, and the sort of people who have ataxia includes many sailors, who are more liable to syphilis than people in general.

As a contribution to this kind of opinion-solution of the unpromising question at issue, I would say that in seventeen cases of this disease which I have seen there was no instance of the presence of evident syphilitic taint, while in most of the cases there was as good proof of the entire absence of syphilis as one could well expect to obtain concerning a negative. Accordingly

these amyloid corpuscles in the augmented neuroglia, which constitutes the grey change in the cord, is but an expression of the normal association of the corpuscles and neuroglia. On the other hand, the amyloid change in the liver is due to a change in the small arteries and capillaries, in which their lining becomes converted into a swollen pellucid layer, with amyloid reaction, no such reaction being normally present, and no relation being traceable between the vessel change and any normal state of the vessel, nor between it and the amyloid corpuscle development of the neuroglia. Thus there is no analogy between the states whereon to found such a conclusion as Lancereaux suggests.

I am disposed to believe that syphilis has nothing directly to do with locomotor ataxia.

If this is true of locomotor ataxia, it is quite otherwise with paraplegia. Of the existence of syphilitic paraplegia we have decisive proof.

The number of instances in which this decisive proof has been obtained is, however, as yet small. I believe I am right in saying that only three cases of syphilitic change in the spinal cord have been published, and of these one case occurred in England, one in Ireland, and one in Germany.

I will now proceed to state the following case of syphilitic change in the cord.

The history is chiefly from notes made at the time by my friend Dr. Douglas.

Chas. W—, æt. 30, a clerk, admitted August 4th, 1870, into Philip Ward, under the care of Dr. Moxon, for paraplegia.

He had had syphilis seven years ago (chancre, no suppurating bubo, slight eruption on skin), also rheumatic fever five years ago, and rheumatic pains at times since. Six years ago he broke his left leg, since which time it had always been weaker than before. Present illness began three weeks ago, when, after a sharp attack of diarrhœa, he first experienced "pins and needles" in the left foot, followed by numbness and weakness, which in the course of two or three days extended up to the groin. Then the right foot was similarly attacked, the tingling and numbness also increasing upwards. During this time, but subsequent to the left foot being attacked, the lumbar regions were the seat of acute pain, which was treated as inflammation of the kidneys. Since two days previous to admission he has been unable to retain motions or urine. He has managed to get about with the aid of a stick, and has suffered no pain in his legs, but only numbness, coldness, twitchings, and weakness. The pain in the lumbar regions has also decreased.

On admission he shows no signs of cachexia in his appearance, which is, on the contrary, healthy. In giving the account of syphilis he declares that the symptoms were soon over, and that he has not suffered from anything of the kind since. Is restive under questioning about it, regarding the syphilis as altogether out of date and bygone. Sensation is lost below the

crest of the right ilium, and on left side below groin. The senses of touch, heat, and pain are alike absent in the legs, but reflex action is excited by a smart touch, and then he feels the spasm rather acutely ; he is, however, unable to localise the feeling thus excited. There is very little power of motion in the legs. He is unable to stand. The bladder requires to be relieved by catheterism.

August 10th.—He is worse ; the motor power is quite gone from his legs; the anæsthesia has extended higher and now reaches to the level of the ninth rib on the right side, and to the crest of the ilium on the left side. There is feeble electro-contractility of the muscles, but no sensation of the current.

18th.—Dr. Douglas believed the legs to be hyperæsthetic. There was inflammatory œdema of left buttock, and threatened bedsore. The anæsthesia now stood about the level of the umbilicus on both sides, but was higher on the right.

19th.—Very feverish, with anorexia and dry brown tongue. An abscess has opened near sacrum on buttock, and bedsore is rapidly spreading. Pulse 120, temp. 100·2°, resp. 29. The state of the urine is very grave.

During the next few days he gradually sank, being clearly sensible to the last. The Hippocratic countenance was marked for at least three days before his death on August 25th. The treatment consisted from the first of ʒj of iodide of potassium, taken in three doses during the day, the belief being that the disease was syphilitic.

Autopsy.—The inspection was made twenty-two hours after death. The body rather short, with black hair, grey-brown iris, and well-formed features. The face thin and hollow looking, the frame very spare. No dropsy. There was a scar as of chancre near the frænum on the glans, but no scar in the groin. An enormous bedsore exposed the sacrum and laid open the lower end of the spinal canal. The gluteus maximus muscle was largely destroyed.

Head.—There were some raised and eburnated patches of round figure on the calvaria, as though from old nodes. The membranes of the brain were thickish over the Sylvian fissure, besides being so in the usual places of thickening. The cerebral arteries were quite healthy. The whole substance of the brain was firm and in all parts healthy. There was an excess

of the usual pigment in the membranes of the medulla oblongata.

Spine.—The inflammation from the bedsore did not ascend along the spinal canal. The dura mater was quite healthy. The arachnoid might be judged a little thickish, but air from a blowpipe raised it; however, this was not done freely, so that on the whole its state was not quite satisfactory. The pia mater generally showed no change, but through it could be seen several brownish or blackish patches of a size from the outline of a barleycorn to a pea. These patches felt distinctly firmer than the surrounding parts of the cord. The cord itself in the lower three fourths was very soft, but in the upper fourth was rather remarkably hard. The patches were in the lower half of the cord, none being present above the middle dorsal region. On section of the blackened spots these were found to consist of dark, tough, flaccid matter, in the centre of which lay small, yellowish, elastic, soft gummatous spots, abrupt and differing in consistence from the dark matter around, so that on section these yellow spots rose into semicircular form, looking like little drops of pus, yet on touching them they were found elastic and solid. They paid no regard to the component columns of the cord, some being in the posterior and some in the lateral column; there were fewer in the anterior column; none were above the middle dorsal region. Microscopic examination in the recent state showed the dark outer zone to be composed of subfibrillated tissue charged with refractile myeline grains, these contrasted with numerous pale nuclei scattered through the substance. The same appearance was found in the central yellowish tissue, but the elements were defaced by degeneration. There were blood-vessels in the outer zone, but the blood in some of these was changed to pigment apparently. The soft spinal cord around showed numerous granular corpuscles, such as characterise white softening.[1]

Chest.—The right lung was bloated with serum; there was a slight pneumonic patch in the middle of the lower lobe of the left lung, otherwise the lungs were perfectly healthy. No trace of tubercle or other disease present. The edge of the epiglottis

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[1] For the appearances of the diseased part of the cord when examined in section of the hardened substance, see the description of the plate accompanying this paper.

was not perfectly straight, but the larynx was practically healthy.

The heart weighed nine ounces. Its right side contained loose black clot. The muscular fibre was deep coloured and soft; there was no disease about it.

The vessels were healthy.

Abdomen.—The stomach contained a little food, and was slightly dissolved on its mucous face in the greater end *post-mortem.*

The liver weighed sixty-eight ounces, and was in shape normal.

The capsule was thin and unadherent; the tissue fatty and coarse looking, not lardaceous.

The mesenteric and lumbar glands were healthy.

The spleen was large and flaccid, not pulpy.

All the abdominal viscera were discoloured from early decomposition.

The kidneys weighed thirteen ounces, and were deep coloured. The right kidney was in a state of suppuration, many pus-spots being present in the cortex. Its pelvis was in a state of severe disease, the mucous membrane suppurating and ulcerating, and intensely and deeply reddened, showing also much ecchymosis.

The ureters were in a corresponding state.

The bladder was inflamed in a like manner.

The testes were both excellent and typical examples of syphilitic orchitis, the texture cirrhosed from the presence of excess of fibrous tissue, in which were in each testis two gummatous nodules of most characteristic appearance, and closely resembling the matter in the cord. The tunics of both were adherent. The epididymis in each case was quite free from the disease. The bones were free from nodes.

Evidences of the nature of the case.—The proofs of the syphilitic nature of the deposit rest on its history, the character of the deposit, and the situation of the deposit in the body.

1. The history notifies the occurrence of a chancre without suppurating bubo, and with little or no account of secondary eruption. In the absence of bubo we have a certain negative confirmation of the syphilitic nature of the chancre. The non-occurrence of eruption, or rather of history of eruption, in cases

where tertiary syphilis of marked kind is present, certainly does not make our case exceptional in this particular. It is the opinion of some authorities that tertiary syphilitic accidents are more likely to occur in cases where the symptoms of the syphilitic fever have drawn least attention, and a comparison has been made with the well-known fact that the milder cases of scarlatina, and perhaps of diphtheria, are most liable to show the special dropsical or nervous consequences of those disorders. The analogy has some strictness; but whatever the value of it may be, certainly the experience of most observers will furnish cases where evident tertiary syphilis of most indubitable nature existed in people from whom the history of secondary or even primary syphilis could not be elicited. We may conclude that the account given amounts to fair ordinary evidence that the man had had syphilis seven years before.

2. *The characters of the formation.*—It is often asked, " Is there anything characteristic in syphilitic deposit?" The question has been so well answered by Dr. Wilks in these Reports, that I cannot do better than quote here his words :—" Is the syphilitic deposit peculiar and distinguishable? This cannot be answered affirmatively, since no elements possessing any peculiarities are found in it. . . . This difficulty, however, in fixing the syphilitic deposit with any peculiar characters, has been considered by some sufficient to discredit its venereal origin, for they have said, why should that be styled specific which presents no other features than those of an ordinary inflammatory product? In answer to this, I would say that, in all probability, time will evolve some distinguishing features in these deposits, but in the meanwhile I would demand of the doubters whether they disbelieve in the formation of a node on a bone, or lymph on the iris, because they are unable to point to the peculiarities of the effused products. I think that the changes in one organ are as characteristic as in another; and thus, if an excavated ulcer, with indurated edges and other peculiarities, is called syphilitic, because these are the appearances usually met with in the venereal disease, so in like manner I should say that fibroid nodules in the liver, deposited towards its surface, and producing a puckering of the surrounding tissue, are due to syphilis, because so frequently met with in that disease. The argument against such a conclusion, taken from

the want of any peculiarity of structure, is equally applicable to the syphilitic deposits on the exterior of the body, as well as to a large number of other morbid changes in the system."

Limiting Dr. Wilks's remarks to the microscopic elements of the syphilitic formation, I believe they are quite exact; but I do not think we should describe the appearances we see by the naked eye as having nothing distinctive about them, although I must confess to feeling a great difficulty in stating in words descriptions that would respond to their distinctive characters. The eye knows them again easily enough.

If one looks over a series of cases of syphilitic change, and compares these with any other forms of change, one finds that the syphilitic cases have characters by which they are practically easily distinguished. These characters I will attempt to state. 1. Generally a small part of the organ is attacked, and the remainder is left quite free. The disease is strictly localised in the spot it affects. 2. Its outer part is composed of fibrous tissue, which can be seen to represent the natural fibrous supporting elements of the part in a state of augmentation, while the functioning elements of the part have dwindled away. It is a local sclerosis. 3. Its central part shows the now celebrated caseous or gummatous faint yellowish matter of more and more elastic consistence and less and less friability and curdiness, generally rather sharply distinguished from the fibrous outer part, and sometimes softening down or calcifying. 4. There are signs of more acute inflammation in the immediate neighbourhood, showing lymph, &c., or adhesions to the parts around. (3 and 4 may be absent.)

Such patches, sharply contrasting with more healthy tissue immediately about them, and (5) distributed more or less widely in a variety of organs, but especially in the testes and liver, are not a general thing that could be passed over as a common accident. Their characters attract attention. A syphilitic gumma in muscle or brain is so unlike anything else that, if seen for the first time by one who knows the rest of the common run of pathological changes, it demands from him some recognition of its peculiarities. In short, it is not common, but specific in the strict sense of the word. I mean that we are not to suppose that these syphilitic changes are of a kind that are otherwise recognised as non-syphilitic, or in any sense of a " common " kind.

It is not so. They are quite peculiar, and strike the eye and the mind as peculiar. Allow that they have characters like the verbal stock descriptions of " inflammation generally " (a thing which has no existence; the commonest inflammation has its common peculiarities). These characters of common inflammation are not the characters that we rely on to know them by; the five characters I have above enumerated do not belong to any other change, and amply suffice to distinguish practically the syphilitic from all other changes.

The general result of observations of the structural characters of syphilitic deposit in all parts of the body is the same, and to this effect, that there are few now who suppose that syphilitic formation presents any characteristic *elements*, or that the absence of characteristic elements invalidates the evidence of the syphilitic nature of these formations.

It is well to remark that the uncertain nature of the elements might have been due to their never having any characters sufficiently defined to distinguish them from any imperfect or indifferent cellular elements, so that the examinations of a syphilitic tumour might not have ever revealed any elements with *character* about them. Just as formerly tubercle was described as being made up of " ill defined," or " imperfect," or " degenerate," or, as it is sometimes put, " poor wretched " cells. But, in fact, the difficulty of recognising syphilitic elements arises rather from their variety of character than their want of character.

In truth, we often find syphilitic formation whose elements are in a high state of development. Thus in a case of syphiloma of the dura mater that occurred the other day, the elementary cells would, I think, have been called " cancer " cells. Some that were pointed to under the microscope showed the possibility of the syphilitic cell reaching a large size, and having a bold nucleus with double contour, and provided with distinct nucleoli; indeed, just such an element as responds to the ordinary futile account of a " cancer cell."

But on the other hand, syphilitic deposit often does not show these defined and well-characterised cells; it may even offer nothing more than common wavy areolar fibrous tissue, more or less deformed, with some fat grains embedded, or some decayed nuclei present in it. These differences are partly a matter of stage or *period of growth.* The large and better formed cells

being new and young, the old fibrous and fatty material being at the period of full development, or senescence, or decay. We nowhere else have so good a reason to think this senescence and decay of formed elements may be due to medicines. These varieties from stage give so much diversity to the characters of the matter formed through syphilis, that some of them may easily be misunderstood by observers who know others tolerably well. To the naked eye the formations offer a like variety. Thus, in the liver an isolated softened red patch is the first stage; it is sometimes met with in cases where the next stages identify it. This red patch is, in the second stage, found to have a pale yellowish sub-elastic tough substance forming in its middle, while around this substance, within the red patch, there is recent fibroid formation of the usual greyish cast of colour, the remains of the red soft patch encircling and spreading around these. Then, as a third stage, a softening or a calcification of the yellowish centre proceeds, or else a simple wasting away of it, which latter is more common; so that there usually remains at last a sunken scar in the place of the tissue, which has in this way been changed and removed. Such a series of states from the red patch to the calcified, softened, or merely scar-like relic, gives scope for great differences in the actual appearance of individual instances, and these stages in themselves would make syphilitic formations various enough. But I believe that all the differences in syphilitic deposits are not due to the stage or period of the growth.

In some cases the syphilitic formation wears very much the appearance of actively growing tumour. This is especially the case in the membranes and cortex of the brain. It forms a large and bold mass, with rounded outline and fleshy consistence, inclosing in the middle some caseous change, but with a considerable proportion of it vascular and fleshy, so that from the appearance alone it could not be told whether the disease were a sarcous tumour or not; and one has to view the whole case and make a judgment, or at least arrive at a conviction from the general characters of the other formations in the body, the history, &c. Such a case occurred at Guy's about five weeks ago. The difficulty in post-mortem recognition was at first considerable.

In the opposite extreme, the syphilitic formation appears in

the shape of small grains, like tubercle, or as diffused yellowish soft material in the membranes of the brain, accompanied by the signs of inflammation in these. Such a case I published among a series of cases of syphilitic disease of the viscera in the 'Guy's Hospital Reports' for 1867.

The difference between these tubercle-like granules and the tumour-like masses is more than one of stage. To realise the relation of syphilis to the former, we may best suppose that a meningitis is qualified by the syphilitic poison, so that the characters of diffuse inflammation and of syphilis are combined, as we often find tubercle combined with the products of acute inflammation. In the other case, it is perhaps true that the disposition to form tumour in the part is similarly qualified by the syphilis, so that the product is syphilitic tumour. I do not intend these suppositions to be explanatory, but only to assert a belief that whatever the causes of inflammation or of tumour may be, they can be determined into syphilitic character by the presence of syphilis in the system.

The appearance of syphilitic formation in the brain is well known. The characters it shows in the cord are, on the contrary, very little known. We depend on the three instances already mentioned for our acquaintance with syphilitic formations in the cord. We will shortly examine these severally.

1. The tumour in Dr. MacDowel's case appears to have been of a different character to that in the present case. The description of it which is given in the Sydenham Society's translation of Lancereaux' 'Treatise on Syphilis' (vol. ii, p. 85) has not lost force in the two renderings from language to language. It appears there thus : "Integrity of the meninges and slight softening of the dorsal portion of the spinal cord, in the midst of which existed a tumour of a yellowish colour, the size of a large pea, of *very* firm consistence ; this tumour *projected* especially on the right ; it was perfectly round, and smooth *and polished* on its surface, *even when looked at with a glass.*" MacDowel's description is as follows ('Dublin Q. Journ.,' N.S., xxxii, p. 321) : "In the central part of its dorsal portion, but extending considerably to the right of the middle line, a tumour of firm consistence and yellowish colour was exposed ; it was perfectly globular, smooth both on the surface and in section, of a fibro-gelatinous consistence, and of the size of a large pea."

It will be seen that the words in the retranslation which I have put in italics have no place in the original. They greatly modify the description, especially the remark that the surface was polished even when looked at with a glass. Still the statement that the surface of the deposit was smooth makes a difference between it and my case, in which there was indeed no surface to the deposit, for the outer part of it was inextricably blended with the cord substance. In judging what was the probable nature of the cord disease in MacDowel's case we must remember that caseous *tubercles* of the cord have a very well-defined surface, and this so that it is difficult to retain the tubercles in their place after section has divided the supporting tissues in which they are encapsulated, for a soft, vascular, usually congested, filmy layer surrounds the tubercle, and in this filmy layer it glides very readily. The substance of these tubercles is not unlike that of syphilitic sarcocele, though it has a nearer approach to friability, and softening frequently occurs at the centre, forming a little, curdy, broken-down cavity. So little sign of their presence may these tubercles give on the surface of the cord that they may be entirely overlooked, indeed, in all cases it is necessary to cut the cord into small slices before supposing that it is free from such disease. In a case that recently happened it was only by so cutting the cord into short lengths that a large tubercle was found in it, no sign on the surface existing—not enough, at least, to draw attention.

The description of Dr. MacDowel's tumour then makes it resemble tubercles, but on the other hand I have already spoken of some syphilitic disease of the brain and its membranes in which the syphilitic mass was firm and tumour-like, and these have a smooth surface from which the brain matter slips off, being in a state of yellow softening. But by very far more commonly the formation in the brain is fixed in its place by continuity with the tissue around. The description by Dr. MacDowel of the matter as not resembling tubercle and as exactly resembling a syphilitic sarcocele that coexisted in the subject, when taken with the fact that tumours with separable smooth surfaces occur in the brain from syphilis, may be allowed to show that, in the cord, as in the brain, syphilitic tumours put on two varieties of appearance, the one encysted and the other continuous with the surrounding tissue, or " infiltrated."

The second case, quoted repeatedly, through a misconception, from Dr. Wilks, was not really a disease of the substance of the cord. The description is as follows: " In the lumbar region of the spinal cord on the right side was a hard deposit, about three quarters of an inch in length. This involved the posterior roots of the nerves, was closely adherent to them and to the spinal cord. It was not defined as a tumour, but formed an irregular long mass about the size of a nut. When incised, it was seen to be composed of an opaque yellow amorphous substance, in fact, of dead or degenerated lymph, and resembling the same in the liver. Dr. Wilks believed this to resemble in every respect the material which is called syphilitic." This report has passed into several languages, and it is generally accepted as a case of disease of the spinal cord's substance (Lancereaux, Virchow). I am, however, informed by Dr. Wilks, that the disease was, in the case in question, limited entirely to the membranes, and did not at all implicate the cord's substance or get through the pia mater.

The third case, by Wagner (' Archiv der Heilkunde,' 1863), corresponds more closely with ours in the deposit having had a bluish-white colour with a yellowish centre; it was in the centre of the left side of the medulla oblongata, and there was another deposit in the left hemisphere of the cerebellum.

Besides these cases of syphilitic formation in the spinal cord, which are all I can find related, there are some mentions of adhesions and gelatinous effusions in syphilitic persons, and once of gumma in the membranes of the cord, to which Dr. Wilks's case should be added; and there is also a case by Potain, wherein the whole length of the spinal cord of a syphilitic infant three days old was converted into a substance resembling a fibrous tendon except for its reddish-grey colour. The descriptions of these cases, however, leave much room for doubt as to the syphilitic nature of the change, and do not give any characters that would help us to describe the specially syphilitic changes in the spinal membranes. That these may differ from those in the brain is suggested by the curious fact which I pointed out (' Path. Trans.,' 1869-70), namely, that tubercular meningitis, when it avoids the dura mater of the cranium, will cover with tubercles the dura mater of the spinal cord on its inner face. There are other facts, such as the common formation of carti-

laginous plates in the spinal arachnoid, while they never occur in the cranial, which prove that it is not sufficient, having described the diseases of the cranial membranes, to assume that the membranes of the cord will show just similar diseased changes. While making these general remarks, I would allude to another point in the anatomy of the membranes of the cord, which has not received enough attention, and certainly has led to some errors. I mean the adhesion between the parietal and visceral arachnoid in the cervical region of the cord. If one looks over cases of cord disease that are recited, one finds that an adhesion of the membranes in this region is not infrequently given as one of the morbid features of the case. Thus, in a case which I proceed to quote from Dr. Meryon's ' Lectures on Diseases of the Cord' (who quotes it from Broussais, and he again from Ollivier), it will be seen that this adhesion, which for all the description suggests was no more than the normal union, is the principal morbid state dwelt on. " There was—(1) some increased vascularity of parts of the encephalon ; (2) considerable congestion of the sinuses of the cord with fluid blood ; and (3) much sanguineous effusion between the dura mater and the vertebral arches opposite the brachial enlargement of the cord ; as well as (4) a considerable quantity of red serum between the pia mater and arachnoid at the lower part ; and (5) the opposite surfaces of the arachnoid were adherent at several points over the brachial enlargement, which part of the cord, especially the grey substance, was (6) remarkably soft for about two inches. The remaining part of the cord below was somewhat softened."

Now of these appearances 1, 2, and 3 are entirely useless. They are the commonest states of post-mortem hypostasis. As to 4, the redness of the serum was probably cadaveric; such redness is of no account whatever, without it be stated whether the trachea and aorta showed a state of imbibition of blood-colouring matter. 5 and 6 are the only changes that would point to real disease, and of these, 5, so far as the description goes, may have been only the normal state I have referred to. 6 could not now be accepted as worth anything, unless microscopic examination were used. Many cords removed in the ordinary way get a blow with the bone-forceps, which softens one or two inches ; and it wants much experience of the results

of these blows to make out the difference between them and real disease.

I believe the post-mortem records of spinal membrane disease which we have are largely vitiated by an insufficient recognition of the natural peculiarities of the cord's membranes. The part played by the cartilaginous plates in the arachnoid is often assumed to be important. In some investigations I recently made on a number of cases to learn the relative frequency of these, I found that fifty-two per cent. of people over forty years of age show some of these plates, and that they may reach a large size and number without any spinal symptoms appearing. Without denying that when their breadth and thickness are extreme they may produce symptoms, I believe that the evidence of their injurious effect in any case ought to be very well supported indeed. For the presumption of their general innocence from the known frequency of their innocence is very strong. The adhesions in the cervical region, which I have mentioned, are most marked on the hinder side of the cord. They are effected by numerous fine points resembling the *ligamenta denticulata*, but not so strong as these. The best works on anatomy, such as Kölliker's, mention them in passing; but the liability of them to the imputation of a morbid origin requires that we should be well acquainted with their existence and character.

3. *The seat of the deposit.*—On this point one recalls in reference to the probable nature of the deposit, if doubt exists in regard of this, that the deposit was in the testis, in its body, and not in the epididymis, and had there exactly the qualities of syphilitic sarcocele, while the similarity of the yellow toughish matter with its surrounding bluish zone in the cord to this deposit in the testis, was very remarkable. No one would, I believe, doubt the syphilitic nature of such a formation, seated as it was in a testis defaced with fibrous orchitis, and having old adhesions of its tunic.

The history of the case.—The characters of the deposit, and the general relations of this in the matter of its situation, &c., will, I think, leave no doubt that the disease was truly of a syphilitic nature.

Symptoms.—The symptoms of any nerve disease stand in two very distinct groups; first, those due to the impairment of function of the part attacked, such as paralysis, anæsthesia, pain,

spasm, &c.; and, secondly, such as belong to the kind of disease affecting the part, such as rigors from pyæmia, fever from inflammation, or, as in the present case, syphilitic manifestations.

Now, although it is temptingly easy to say that the first of these groups of symptoms, those due to the seat, will be just the same, whatever the cause; and though there is a certain force in the remark, yet that remark must not be hastily made, for it will be found practically that the occurrence of symptoms pointing to a certain *locality* in the nervous system as the seat of disease, often aids importantly in determining the *nature* of the disease. For example, if common paraplegia of the lower extremities occurs in one person, and common hemiplegia occurs in another, we may nearly certainly know that the first case is not due to hæmorrhage, while the second very probably is. Or to take a less simple example: if symptoms in a case point to a disease of the surface of the brain, implicating some of the nerves as well as the membrane, such as limited paralysis, great pain and epileptiform seizures, not only is the seat indicated thereby, but the case is very probably one of syphilitic disease, which commonly attacks surface, and when it so chances seizes upon and paralyses any nerve in its way. In short, as special diseases have special habits of place, we are guided to a knowledge of the disease by a knowledge of its locality. In our case there was a point in the symptoms of locality which drew attention during life, and proved to have a bearing on the diagnosis. The question was, whether the case was one of common softening of the cord, or of some special, as we supposed, syphilitic disease of it. Now, in a large proportion of the cases of common softening of the cord that we have met, one finds that the anæsthesia is limited above by about the course of the twelfth dorsal nerve. This, I believe, is very generally so, and the condition is about equal on the two sides. In our case, however, the anæsthesia extended as high as the right eighth dorsal nerve, while on the left side sensation was maintained as far as the crest of the ilium. This aberration of the case from the usual locality of softening already pointed to a disease of other nature and habitat.

Another most important criterion in determining the nature of nervous disease is the rate of progress and order of sequence

of the several symptoms. It has already been remarked by an able writer on syphilitic disease of the nervous system,[1] that in the course of these affections the symptoms produced show two distinct kinds, in the important point of duration and consequences. Some symptoms come suddenly and disappear with a like quickness. Others arise slowly, and increase gradually, and persist tenaciously; often altogether refusing to decline, although the proper specific remedies be fully employed with results completely satisfactory as to all accompanying manifestations of the syphilitic cachexia.

It is interesting to remark that the varieties of paralysis which in syphilis suddenly come and go are such as commonly appear in a "functional" form from other causes. These are especially hemiplegia, and the various kinds of ocular paralysis. Passavant, in the paper cited, advances a hypothesis in explanation of these transient paralyses; he thinks they may be due to such disease thickening the arterial coats, as shall narrow the channel of the artery and impede the flow in it, so that in a casual state of weakness of the heart's pressure, the force shall not be enough to carry blood by the obstruction. And hence, during such weakness, the part of the brain supplied by that artery shall be starved and palsied, until the heart recovering due force the thick artery yields again, and circulation and, with it, function are restored to the affected region of the brain. This idea is ingenious, and it certainly is true in support of this view or some one like it, that the transient paralyses affect those parts of the brain whose arteries are especially liable to disease, namely, those supplied by the middle cerebral and basilar arteries, vessels which we so constantly find to be diseased.

On the other hand, the nerve affections in syphilis which prove permanent, are those which point to direct syphilitic changes in the nervous substance, and among these paraplegia is already recognised (by Zambaco and others) as holding a conspicuous place; along with changes in the retina, choroid, or iris, which can be directly seen to be unaffected by remedies when once their destructive action has taken effect, and with evidences of change in the cortex of the brain. For all these, though relieved and checked by antisyphilitic medicines, yet too

[1] G. Passavant, 'Virch. Archiv,' 1862.

often are not entirely removed, and show unhappy proneness to recurrence.

It has been a matter of surprise that this obstinacy should characterise the results of syphilis when mercurials and iodides have the power of overcoming the symptoms of syphilis. But reference to the nature of the gummatous change, as shown in the figure accompanying this paper, will show sufficient reason for the non-recovery of the nerve-tissues. The fact is that when what is called syphilitic deposit occurs in a part, that word *deposit* is apt to mislead as to the real nature of the change; it is not a lodgement of syphilitic matter among the proper elements of the part, it is a change of those elements into the syphilitic matter. They no longer exist in the " deposit." The figure shows that the considerable portion of the cord affected is simply effaced; there is no sign of pressure on the tissue around, as would be exerted by the presence of a new mass of such a size; the tissue around is uncompressed. The mass is no new matter forced in, it is destroyed cord-tissue, and hence the irrecoverable nature of the change as to the region actually affected is too plainly manifested. The usual result of treatment is to check the disease, and perhaps stop its progress for a long while, but leaving still present such paraplegic weakness and numbness as is consequent upon the loss of so much substance of the cord.

Hence, then, it appears that the aid one gets in discovering an actual syphilitic change in the nervous system must, in a certain degree, depend on the mode of attack of the symptoms. A hemiplegia or ocular palsy that is sudden and short lived may arise in a syphilitic patient. But it is very doubtful whether such short-lived paralysis is due to syphilitic changes directly. As a single striking instance, I will mention the following case, which occurred among my out-patients. A woman, aged thirty-six, applied for relief of a paralytic and painful affection of the left arm; the deltoid muscle was wasted almost away, and other muscles in the arm were strikingly atrophied. The head of the humerus was very painful, and also very sensitive to pressure. She suffered severely with nocturnal pains in the limbs, and had a recent node on the left parietal bone. She had had several miscarriages, and she wore the aspect of syphilitic cachexia in a very marked form. After

attending for two weeks, during which time general tonics and electricity were tried for her relief, with the intention of ascertaining whether nonspecific remedies would cure the affection, she presented herself much distressed by the sudden occurrence of an internal squint from paralysis of the sixth nerve of the left eye, which had come on two days before. This sudden ocular paralysis passed off in ten days, leaving her sight unaffected. And it is specially to be noted that this recovery occurred before anti-syphilitic remedies were used. The arm mended very slowly during the further sixteen weeks, in which she remained under treatment, which latterly consisted of a free exhibition of iodide of potassium. The experimental non-specific plan used during the first four weeks not having any success in reducing the painful paralysis of the arm, the iodide was followed by the partly satisfactory result above related. The obstinacy of the wasting palsy of the upper limb contrasted remarkably with the volatile shortness of stay of the ocular paralysis. There cannot be much doubt that the causes of the two paralyses were different, that of the arm being due to syphilitic deposit involving the nerves of the limb, that of the eye to some interference with the blood supply of the centre of the sixth nerve, probably by disease of the coats of its vessels.

There is great room to doubt and inquire whether these volatile transient paralyses are indeed due to any syphilitic changes when they occur in syphilitic cases among other nerve symptoms. The pathologic relation of temporary ocular with hemiplegic paralysis is a question of the greatest interest; much material is at hand for its solution. It is clear that transient ocular palsy associates itself with various other nervous diseases. It is seen in the vague cases called hysterical. It is common in locomotor ataxia, and it appears in other spinal diseases of a wholly different kind. Curiously, on the same morning when the syphilitic woman came complaining of the squint, another woman came, next but one in order, who had likewise had a sudden seizure of ocular palsy, the right sixth nerve having lost power, totally, in a single night. This woman had been for ten months under my care for an affection of the cervical cord, shown by wasting of the muscles of the forearms and hands, and still greater wasting of the muscles of the left side of the back of the neck, where a deep hollow had resulted from the loss of

muscle. In her case, too, the ocular palsy was soon over, and evidence of the usefulness of Faradisation in this case was very convincing. For the paralysis remained entirely unchanged for two weeks. Then I prescribed Faradisation three times in the week, and by the second week from that time the palsy had entirely gone. The woman has been since then under observation fourteen months, and although her general state does not mend, no fresh paralysis of the eye has occurred. There is no suspicion of syphilis in the case. I have met, in two other cases of organic spinal cord disease of uncertain nature, the like transient ocular paralysis. Such evidence of the general association of these temporary paralyses with various sorts of disease in the cord, and of its occurrence without evident disease, would show that the temporary eye-paralysis in syphilitic cases is probably not due to syphilitic formation in the nerve substance. The same may be said of the temporary hemiplegic attacks. What the pathology of transient hemiplegic seizures may be is a question of great interest, and open to a variety of solutions, although it seems clear that interference with the arterial supply of the corpus striatum, either in its quantity or quality, is the determining cause of the accidents. But whatever be the cause of temporary hemiplegic attacks, they are too common under ordinary circumstances to make it at all sure that, when they occur during the course of syphilitic disease of the nervous system, their cause is a direct syphilitic change in the nerve substance. They very probably mean no more in the syphilitic than in other cases, and are due to changes of circulation.

I think these remarks necessary, because of the almost natural disposition to regard syphilitic disease of the nervous system as a thing likely to be cured easily, even when it has progressed for some time. No doubt it is not so. Syphilitic gumma is a destructive change as regards the functionary elements of tissues, although it may prove constructive in bone or fibre-tissue. This is no contrariety. It is the rule that inflammation, while it is productive of fibre-elements and their allies, bone, &c., is destructive of gland-cells, nerve- or muscle-fibres and their allies. If it be true, as suggested, that the transient paralysis in syphilitics belong to a usually transient class of paralysis; while the paralyses which do not belong to

the usually transient class are not transient in syphilitics, but permanent and capable only of being checked, not cured, by our antisyphilitic remedies, then the fair conclusion is this, · that only the latter permanent class are peculiar and proper to syphilis, and only these depend on its proper destructive changes on the part of the nervous system it has happened to select.

What, then, are the proper symptoms of syphilitic disease of the cord? The facts of published cases, and the probabilities of the disease from analogy with its behaviour elsewhere, would urge this reply—The symptoms of syphilis and the symptoms of cord disease. The principal practical object in stating the present stage of knowledge of the symptoms of this disease I believe is this, to avoid erecting rules of diagnosis which are exclusive. It is much more important to avoid over-looking the syphilitic nature of a case than it is to avoid erroneously supposing syphilis to be the cause of paraplegia in any case, because the first mistake involves the patient's death or disablement, while the second mistake only entails his taking some unnecessary iodide of potassium. Already a rule is pub-lished which would, if followed, have caused the syphilitic nature of our case to have been denied. Lancereaux has the following passage when speaking of the diagnosis of disease of the cord:

" The diagnosis of syphilitic myelopathies generally presents great difficulties, and if it happens that these affections some-times pass unperceived, it is not uncommon, on the other hand, to see attributed to syphilis, and treated accordingly, cases of paraplegia which are anything but syphilitic. It is important, then, to be clear on this point; and on that account it must not be forgotten that the tertiary syphilitic lesions of the spinal cord have for their chief characteristic, like the cerebral hepatic and pulmonary lesions, to be circumscribed, to be slow in their evolution, and to be insidious in their onset; and thus it will be understood that these lesions, while they paralyse voluntary motion, generally leave intact in part at least, the sensibility, and above all the reflex movements of the extremities. But are we on this account to refrain in all cases from attributing to syphilis a lesion which, having destroyed a certain extent of the spinal cord, shall have abolished motion, sensibility, and reflex action? If it be possible to speak in the affirmative on this point as regards the manifestations of the tertiary period, I believe that

we should be more reserved with regard to the possible lesions of the spinal cord supervening during the secondary period."— Vol. ii, p. 88.

Now, in our case the disease destroyed a certain extent of the spinal cord, paralysed motion, sensibility, and at last reflex action, yet although Lancereaux infers that under these conditions it is possible to affirm that such disease is not tertiary syphilis, the whole cause of the disease was nevertheless tertiary syphilis. Hence we may learn at least not to set up diagnostic rules too early. True syphilitic changes are slow in their evolution, but our case shows that this slowness need not be marked. In a few weeks the man's case was entirely hopeless. It is important to notice that in this case a white softening accompanied the syphilitic formation; such a white softening accompanies very commonly, but not constantly, the syphilitic disease of the brain. It is absent in those cases that most approach tumour, and present in those that most approach inflammation. The softening had progressed to severe degree, and this it probably was which rendered the use of iodide of potassium so unavailing as it proved to be.

It appears certain that any symptoms of spinal disease may result from syphilis. In the few cases that have occurred already, there has been a variety of locality which prevents our referring to any locality as argument for syphilitic nature. Wagner's case showed disease of the medulla oblongata, and the one just related had deposits in all the columns of the cord at several levels, so that the locality symptoms may be varied indefinitely. The rate of progress of the symptoms, though usually slow and varying, yet may be rapid and steady.

Treatment.—On this point I wish only to say that I believe in every case of unexplained paraplegia it is advisable, as a precautionary measure, to commence early with the use of iodide of potassium. It can practically do no harm. Its general effects are diuretic and tonic, and though I have used it freely, I have never seen ill results; on the other hand, patients who have been taking the iodide freely, commonly declare themselves better in bodily health. Even the catarrh, or the mottled rash that it sometimes causes, will go off under its continued use, and only require the dose to be diminished. Idiosyncrasies excluding its use are rare. Hence there is no reason why it

should not at once be used in all cases of obscure insidious nerve-centre disease, except that it may tend to prevent our attaining accurate subsequent knowledge of many of these cases, and especially to interfere with our obtaining interesting " syphilomata," after thoroughly complete diagnosis has been awaited and achieved. Further, I believe that when a syphilitic formative disease of the nervous system has become established, it is then right to actively use mercurials. It is very common to see the iodide fail when the disease is advanced. The miserable course of these cases is too well known. This is often doubtless due to accompanying softening of the tissue of the brain around the deposits, which in turn is generally due to obstruction of the arteries and other consequences of the syphilitic deposit, so that the liability to this softening calls also for the immediate use of the most powerful remedies when the syphilitic character of the case is recognisable with any certainty. A case by Passavant (' Virch. Arch.,' 1862) is very instructive. A man was several times in the course of two years raised from a state of incoherency and almost total general paralysis by the free use of mercurial inunction. In reading the account of the case, one cannot help the thought that with our usual milder measures the case would much sooner have terminated. I believe that the early use of the iodide of potassium when obscure nerve symptoms occur, and the determined use of mercurials when pronounced syphilitic disease proves obstinate under the iodide, would tend to cut off the supply of these interesting cases from our post-mortem rooms.

DESCRIPTION OF PLATE,

Illustrating Dr. Moxon's case of syphilitic disease of the spinal cord.

Fig. 1 represents a transverse section of the cord in the upper lumbar region, cutting through the middle of one of the syphilitic patches. This is seen in the left lateral column, occupying a large moiety of the section of that column, and coming fully up to the surface, although not altering the pia mater to any notable extent.

Fig. 2 represents a radial segment of the syphilitic formation in the cord, and shows the condition from (*a*) the border of the disease towards the substance of the cord's column to (*g*), the centre of the diseased formation.

This segment shows the elements present in the several stages of the disease, the relations of these elements to each other, and to the elements of the tissue affected.

At (*a*) is seen a portion of the lateral column of the cord cut rather obliquely, the nerve-fibres (*a'*) with strong outlines, and having among them many of the well-known " granule-corpuscles " (*a''*) which characterise white softening.

At (*b*) these fibres are greatly wasted and disappearing. At the same time round bodies, smaller and clearer than the granule-corpuscles, are present. The origin of these I cannot make out, but they appear to graduate into the form of the more proper corpuscles of the syphilitic formation. These are seen at

(*c*) as nuclear bodies. The cell-wall, which probably surrounds them, is indistinct, and has apparently joined or coalesced with the small quantity of inter-cellular matter, so that the nuclei are the most distinguished things, and these nuclei branch (*c'*), and their branches join each other. In parts (*c''*) these unions of the nuclei are arranged in a circular or vorticose way, such as some observers think to be characteristic of lymph-gland like or " adenoid " tissue. At yet other points (*c'''*) the nuclei are seen to be freely proliferating.

At (*d*) the elements assume the appearance of a band of fibrous tissue, so that an attempt to limit the disease had occurred here. The proliferation of the nuclei is beautifully seen at this spot. Next to this at (*e*) the same elements as at (*c*) are seen.

At (*f*) the elements are growing indistinct, and at (*g*) they have lost their outlines, and appear to have melted away into a mass. Yet careful study of the edge of a thin section shows their dead bodies lying in the same connexion with each other as they had when living in the growing part of the disease at (*c*), (*d*) and (*e*).

(*v*) is a small artery.

(*v'*) is a capillary vessel.

Fig.1

TREATMENT OF PERFORATIONS OF THE MEMBRANA TYMPANI.

By JAMES HINTON.

In a former paper, on " Accumulation of Mucus in the Tympanum," I remarked that my experience of the benefit derived from washing out that cavity in cases of old catarrhal affection in which the membrane had not given way had induced me to have recourse to a similar method in the treatment of perforations spontaneously occurring. I wish to add a few more observations on this subject.

Several years ago, in using a method advised by Dr. Adam Politzer, of Vienna, namely, that of filling the ear with a warm solution of sulphate of zinc (gr. ii—v, ad ℨj), and passing air powerfully through the Eustachian tube at the same time, so as to cause the lotion to be freely distributed over all parts of the tympanum, I observed in many cases a marked improvement follow, which seemed to me to be due to the removal from the cavity, by that means, of masses of coagulated mucus. I found this plan, however, not always to be relied upon, even when most perseveringly used and accompanied by other methods of bringing about a healthy action of the accessible portions of the cavity. My experience in this respect appears to have been the same as that of others, for two or three years afterwards another method was recommended by Dr. Hermann Schwartze, of Halle, viz. the introduction into the meatus of a solution of nitrate of silver from fifteen to forty grains to the ounce, and forcing this through the tympanum and Eustachian tube by means of a stream of air blown through a tube closely fitting the external meatus.[1]

Dr. Schwartze's recommendation was to neutralize the caustic

[1] ' Archiv für Ohrenheilkunde,' vol. iv, 1868-9, p. 1.

after letting it remain in the ear about a minute, by injecting
in the same way a warm solution of common salt, and then to
syringe out the precipitate thus formed. The ear was to be, if
possible, daily cleansed and dried, and the caustic solution used
as above described, the strength being diminished as soon as an
improvement in the swollen mucous membrane was perceptible.
Very rapid cessation of discharge and improvement of hearing is
stated to have been the result of this treatment; though it
required the aid of solid caustic when any granulations were
present, however small, and was, of course, insufficient, though
beneficial, in case of ulceration of the bone. No ill effects
appear to have been observed from its use, except in one case
not under Dr. Schwartze's own care, in which the blowing-in
of the solution was trusted to a non-medical person, and a very
severe inflammation of the opposite tympanum was set up. In
consequence of this occurrence, Dr. Schwartze now advises that
the head be not placed in a horizontal position, but merely in-
clined towards the opposite side.

To this method I have given a certain trial, and believe that
its effects are often good. I found it, however, apt to be painful,
and I felt an objection to the neutralization with salt on account
of the flocculent deposit which it produces within the tympanum,
the complete removal of which by the syringe seemed to me
not so certain as was desirable. The plan to which I now have
recourse, and which seems to me on the whole the most successful
I have tried, is a very simple one; while its results have certainly
been practically better, and theoretically, I think, much surer
and more likely to be permanent than any that I have obtained
before. In the acute stage of a perforation it is inapplicable,
but in almost all others it is, I believe, the most appropriate.

Having ascertained that the Eustachian tube is pervious, or, if
it be not, having rendered it so by the appropriate means, if
possible, and having first thoroughly cleansed the ear by
syringing, during and after a free passage of air through the
tube, I fill with a warm solution of bicarbonate of soda (Θj—$\mathfrak{z}j$)
a syringe, the nozzle of which is made large enough to close
the orifice of the meatus, and is well guarded with India
rubber; and with a moderate but continued pressure seek to
pass the fluid through the perforation and the Eustachian tube.
The head being slightly bent forward, and the patient being

told that he must breathe through the mouth, the fluid escapes through the nostrils without inconvenience. A very temporary giddiness, much greater if the water be either too warm or too cold, is the only ill effect I have observed. By this means, in certainly the great majority of cases, either immediately or after a few repetitions, large quantities of evidently old and more or less dense mucus are removed. In many cases these come visibly from the tympanum, and the passage of the fluid will cause masses of similar secretion to become visible about the perforation, and removable by the syringe, when none have been within reach or sight before. Possibly, in some other cases these masses of secretion are dislodged rather from near the faucial orifice of the Eustachian tubes, or even from the nostrils ; but the stream of fluid, after escaping from the Eustachian tubes, has of course no mechanical force. My own conviction from experience is, that in the great majority of cases of perforation of the membrane, where a chronic discharge has continued, large quantities of a similar discharge remain collected in the various parts of the tympanic cavity, and that the solution of soda used as described washes it bodily away. The amount of secretion, partly, at least, of old-standing, that I have thus sometimes removed day after day is enormous, and a corresponding improvement in the hearing has given testimony that it has been collected in some spot where it was injurious to that function.

This washing out of the tympanum I repeat two or three times a week until mucus in large quantities, indicating the presence of old accumulations, ceases to be brought away ; using also a warm alkaline lotion to fill the ear night and morning, air being at the same time blown by the patient through the Eustachian tube. When it appears that what mucus had become condensed within the tympanum is approaching its complete removal, I add to the solution five or ten grains to the ounce of chlorate of potash, and, when the removal seems complete, substitute for it some astringent. Formerly, I used chiefly the sulphate of zinc, but I found this, even in weak solutions, very painful, and have lately substituted for it alum, I think without disadvantage. By using in the same way a warm solution of alum (gr. v—xx, ad ℥j) an astringent effect is obtained upon the whole membrane of the tympanum, tube, and adjacent faucial region, and I have scarcely ever known the

discharge fail to cease under its use repeated at intervals of three or four days; the hearing usually remaining improved. I think under this plan I have found a recourse to the artificial membrane less frequently necessary, and that I have seen healing of long-standing perforations, and of perforations attended with unhealthy conditions, such as polypi at the edges, or great thickening, or displacement, ensue where I should not have anticipated it under any other method. The conviction, indeed, has been strongly induced in my mind that retained secretion is the chief cause of protracted mischief in all cases of this sort.

To the same cause I attribute the unsatisfactory results which ensue so often from simple treatment by astringent lotions. Granting that the discharge ceases, this is very apt to be quite unattended with improvement of the hearing, and the cases are not few in which the result appears to be contrary. Very often we hear that while discharge is present the hearing is at its best. Not doubting that this latter circumstance may have other causes also, I am persuaded that a very frequent one is that the discharge which forms within the tympanum becomes caked and hard, and that the ear may seem to be restored to health while it is in truth at the farthest remove from that condition.

In this respect the following case gave me both surprise and instruction.

CASE 1.—19th May, 1870. Miss A. E—, æt. 11; healthy; between two and three years ago had scarlatina very severely, which left her very deaf, and with a discharge from both ears. For two years she was under the care of one of the most justly respected aural surgeons of the Continent at various intervals; he had last seen her during the previous July, when the discharge had entirely ceased, and he had said that there was nothing more at that time to be done for her. The deafness, however, continued very considerable, and lately there had been some slight return of discharge. The treatment had been by the Eustachian catheter and the use of lotions, among which was one of sulphate of zinc.

On examination I found the nervous power on the left side apparently very much injured; the membrane was extremely collapsed. On the right side my watch was heard at three inches, and the nervous power seemed unimpaired. The mem-

brane was destroyed for about a third of its extent anteriorly. Air passed through the Eustachian tube. Syringing removed only small flakes of recent secretion, but the appearance of the remaining portion of the membrane suggested to me the presence of retained secretion behind it, and the treatment by the solution of soda was had recourse to. On the first two or three occasions nothing was removed, but the alkaline lotion was employed, and very shortly the solution, as it escaped from the nostrils, brought with it dense brown masses of secretion that had palpably been lying concealed for months. At the same time, on exploring the meatus, the same kind of matter was found to have exuded into the tympanum, and was removed by the syringe. This was continued day after day with the same result, the quantity of the retained matter being quite inexplicable, except on the supposition that it had filled the mastoid cells and was being gradually washed out from thence. Coincidently the portion of the membrane remaining assumed a more natural appearance, and resumed more nearly its normal position, and the hearing decidedly though slowly improved.

In the autumn the child returned to me; the hearing had remained better; a slight discharge had continued for the most part. On renewing the treatment still more of the same discoloured discharge was removed, and was proved in the same way as before to come from portions of the tympanum inaccessible to syringing. When the whole was apparently removed alum was substituted for the alkali, and the discharge disappeared. The case is still under my observation, and it is my expectation that the orifice will heal.

I do not make any comments upon this history; but it would certainly indispose me to recommend astringents and syringing merely, for any similar case.

Some instances of recent perforation in which I have employed the same method have served to render explicable to me the collection of the very large quantities of secretion which I have found in cases of longer standing. In these recent cases I have sometimes found the tendency to the production of abnormal secretion in the tympanum and the adjacent parts so extreme, that for weeks a nearly daily syringing in the way described has on each occasion brought away almost a teaspoonful of viscid mucus. In these cases no doubt the tendency to excessive mucous

secretion existed to an unusual degree, but it seemed to me that they in their extreme features gave a key to the cause of the obstinacy with which perforations of the membrana tympani frequently remain unhealed, and in a more or less unhealthy condition, in spite of ordinary cleanliness and general care.

Of course while carrying out this mechanical treatment other means are also employed. Among them is the nose-douche, for which I generally use the same solutions as I have mentioned above, bicarbonate of soda, chlorate of potash, and alum in succession: in the later stages I frequently apply powdered alum by means of an elastic bag to the faucial region behind and above the tonsils. When the accumulated secretion seems nearly removed I advise the daily use of a lotion of perchloride of mercury (gr. $\frac{1}{3}$—3j), with five or ten drops of tincture of opium. If granulations exist on the exposed surface or the edges of the perforation, I apply to them, by a camel's-hair brush, first, the liquor plumbi, and afterwards a caustic of either the nitrate of silver, or the chloro-acetic acid, which latter is very efficient and safe, and I think scarcely more painful than others in proportion to its effect.

It happens occasionally that, although air passes freely through the Eustachian tube, the liquid will not flow in the opposite direction, owing, perhaps, to a valve-like action of the relaxed mucous membrane. In these cases a sufficient cleansing of the tympanum may be obtained by reversing the direction of the current. The patient may himself force the liquid through the Eustachian tube and completely into the external meatus by leaning the head to the corresponding side, syringing an ounce or so of the fluid along the corresponding nostril, and then trying to inflate the tympanum; or the catheter or elastic bag may be used to produce the same effect. Before adopting this procedure, however, I always advise the nose-douche to be used freely for some days.

I have found this method of treatment especially available for those cases in which, together with the long standing perforation and discharge, there existed also great general disorganization and a granular condition of the membrane or exposed tympanic surface, a class of cases of which the treatment was very apt to be disappointing from their great liability to relapse.

ON THE

MURMURS ATTENDANT UPON MITRAL CONTRACTION.

By C. HILTON FAGGE, M.D.

SINCE Dr. W. T. Gairdner, in the year 1861, published[1] his well-known account of the presystolic (or, as he prefers to call it, the *auricular-systolic*) murmur, the subject has attracted much attention at Guy's. And, particularly, during the period of four years in which I acted as Medical Registrar, I was very careful to preserve detailed notes of the physical signs that presented themselves in all cases of this kind admitted under the care of my senior colleagues, as well as of those which were placed under my own charge. In this way I have accumulated observations of a considerable number of cases, in each of which a presystolic bruit was detected. And since the ' Guy's Hospital Reports' have not, so far as I know, hitherto contained any reference to the subject, I have thought that it might be interesting to give, in the present volume, some notes of the cases in question, and of the conclusions which appear to be deducible from them.

For this purpose I have asked my colleagues' permission to make use of the notes which had been made at different times

1 " A Short Account of Cardiac Murmurs." Being a portion of a lecture on "Modern Cardiac Pathology and Diagnosis," delivered before the Royal College of Physicians of Edinburgh.—' Edin. Med. Journ.,' vol. vii, part i, p. 438.

of cases under their care—a request which has been most willingly granted ; and I have also been glad to avail myself of the systematic records of post-mortem examinations kept during the same period of four years by Dr. Moxon, who has himself studied this subject very closely, and who has examined with me many of the cases in the wards.

Before passing on, however, to describe the cases which have come under my observation, I wish to turn, in the first instance, to the history of the subject, which has been unaccountably neglected by almost all English writers on the presystolic murmur. But it seems necessary to preface even this by a brief résumé of the main characters which I believe to attach to such a murmur, so that the reader may know what is the stand-point from which I regard this matter; and it will, perhaps, conduce to a clearer understanding if for the present I speak of the murmur as simply a *direct mitral,* avoiding the use of the word *presystolic* until I shall have more exactly defined its characters.

I. The first and most important, although not an essential quality of a direct mitral murmur is its *place in the cardiac rhythm.* It is "*presystolic.*" The " first sound of the heart" is no longer the first audible sign of the heart's waking up from its quiescence during the pause ; it is *preceded* by the morbid sound or bruit. The relation can probably be expressed in no way so well as by a diagram, after the manner first suggested by Dr. Gairdner.

II. The direct mitral murmur has a special *seat.* It is loudest over the apex of the heart, and is generally confined to the region of the apex. It is inaudible or scarcely audible at the base, and is very rarely carried round the axilla to the back. If the stethoscope be placed over the third left costal cartilage the

natural cardiac sounds are perceived (unless there be coexisting aortic disease).

III. The *quality* of a direct mitral murmur is, in most cases, peculiar. Almost all those who have written on this subject have remarked that the " presystolic bruit" has a *rough, churning* (or, as Dr. Salter calls it, " *grinding*") character, which of itself enables the auscultator to suspect its nature and origin.

Indeed, I do not find among my notes the record of any single instance in which such a murmur has been a soft souffle, or musical, as is often the case with systolic mitral and other murmurs, heard at the apex of the heart. A presystolic bruit is also very frequently accompanied by a marked palpable thrill or " frémissement cataire."

This rule as to the peculiar quality of the direct mitral murmur is, however, sometimes deviated from in a way which has not, so far as I know, been noticed by writers on the subject, but which is deserving of the utmost attention on the part of the practical auscultator. The murmur is occasionally so short and sudden that it resembles rather a tone, and is in itself hardly to be distinguished from the natural first sound of the heart.

In reference to this matter let me quote some points from a case which will be detailed further on (*vide* Case 2, p. 272). A woman was admitted under Mr. Bryant's care with gangrene of the left leg and foot; it became a matter of great importance to determine whether there was any cardiac disease which would give probability to a diagnosis of embolism. On examination I found that the heart-sounds at the apex seemed perfectly natural. Just as I was leaving the patient I noticed that at one spot the apparent first sound was slightly prolonged ; this led me instinctively to place my finger on the carotid artery. I then discovered to my surprise that this apparent first sound in reality preceded the carotid pulse by a distinct interval, and that the apparent second sound was really the first sound. The apparent first sound was thus shown to be a phenomenon of disease, a *presystolic* or *direct mitral* murmur. Upon this stethoscopic observation alone was based a diagnosis of contraction of the mitral orifice : a diagnosis subsequently verified by an autopsy. Dr. Moxon also examined the patient more than once during life, and agreed with me as to the nature and origin of the physical signs.

It is of course implied in the preceding paragraphs that we have a method of determining the exact time of the ventricular systole, and for this purpose I believe that there is no plan so satisfactory as that recommended by Dr. Gairdner, namely, feeling the carotid pulse at the same time that one listens to the heart-sounds.

The simultaneous appreciation of a pulse by the finger and of a sound by the ear is no doubt a matter of difficulty at first, and requires some special education of the senses. The most favorable subject for enabling one to acquire this little art in the first instance is a person, free from cardiac disease, in whom the heart beats slowly, at the rate of fifty or less pulsations in the minute. A few opportunities of practising on such an individual will, I believe, warrant the student in speaking with certainty as to the rhythm of any cardiac murmur, provided the rapidity of the heart's action do not exceed a certain limit.

An even smaller amount of practice will enable the observer to satisfy himself that the radial pulse follows the carotid pulse (and therefore the ventricular systole) by so great an interval that anyone who trusts to the pulse at the wrist for the determination of the exact time of the heart's beat must necessarily fall into frequent errors. The length of this interval varies under different conditions; it is especially marked in cases of aortic regurgitation.

Hitherto, however, many physicians[1] have been in the habit of using the radial pulse to fix the time of the heart's beat. Hence it has happened that two very different mistakes have been made. On the one hand a diastolic murmur has been regarded as systolic, and when such a murmur has been heard at the apex a case of aortic regurgitation has been mistaken for one of mitral insufficiency. Of this I have seen more than one instance. On the other hand, a systolic murmur has from the same cause been supposed to be *pre*-systolic; and this I believe to have been the reason why students have ascribed such a rhythm to many murmurs which I could not regard as other-

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[1] Dr. Hyde Salter, in his interesting lecture on this subject (which will be referred to subsequently) says, "You have but to put your finger on the wrist, and ascertain that the sound occurs before, and just before, the arterial pulsation. This fact once ascertained leaves no alternative, and from it there is no appeal" ('Lancet, 1869, ii, p. 601).

wise than systolic. The error is one which needs to be carefully avoided, for nothing is more likely to cause doubt as to the possibility of diagnosing contraction of the mitral orifice than finding a wide mitral in a case in which a *spurious* presystolic murmur had been heard.

It has been asserted on theoretical grounds that the rigid conical tube into which the mitral valve is converted in so many cases of contraction must necessarily be unable to close, and hence that the direct mitral murmur must almost invariably be followed by a second, regurgitant murmur. The results of clinical observation, however, are absolutely opposed to such an assertion. In a very large proportion of cases in which a presystolic murmur is heard, the first sound of the heart is peculiarly clear, sharp, and ringing. It thus comes to resemble very closely the natural second sound, and this resemblance is of course strengthened by the fact that it is preceded by a prolonged droning murmur, which may easily be taken to be systolic in rhythm if the auscultator be not careful at the same time to feel the carotid pulse. I have long been familiar with the fact that I could myself easily thus mistake the " first " for the " second " sound of the heart; but I have only lately discovered that the same mistake is uniformly made by the students who have gone round the wards with me, and whom I have tested in reference to this point. When I have asked a medical ward-clerk, or even a house-physician, what he has heard on listening to a case in which a direct mitral murmur has been audible, and, even when he has known that I considered this murmur to be "*pre*systolic," his answer has constantly been, " I hear a rough murmur, and after that a sharp, clear *second* sound." But I have afterwards found no difficulty in teaching him to determine for himself, by placing his finger on the carotid artery, that this apparent second sound has in reality been the first sound.

I must say further that even when I had, by means of the carotid pulse, ascertained the systolic character of the sharp, clear sound heard in such a case, I have myself more than once found it impossible to determine the same fact by means of auscultation alone.

It is probable that the statements in the preceding paragraphs will surprise some readers, who have been in the habit of believing that a presystolic bruit always " runs up to " and is continu-

ous with a first sound, or a systolic bruit; and that the danger of overlooking the direct mitral murmur in practice arises simply from this continuity.

It appears to me, in fact, that in many of the current descriptions of this murmur too much stress is laid on the point in question. I will not, indeed, say that an actual interval exists between the presystolic murmur and the first sound, considering how small a space of time can be ascribed to such an interval. But this opinion I will venture to express : that a presystolic murmur is very often quite as distinct from the following first sound as is a systolic aortic murmur from the following second sound ; yet no one has supposed that such a systolic murmur is likely to be confounded with a diastolic murmur.

When the first sound or the systolic element of a murmur has been determined, and it has been ascertained that another murmur or part of a murmur exists in the interval between the ventricular beats, the next point is to decide whether this murmur accompanies or replaces the second sound, or whether it is a new sound preceding the first sound—in technical language, whether it is a " *diastolic* " or a " *presystolic* " bruit.

Generally speaking, this point is very easily decided. The *pause*, during the period when the heart is at rest, separates all the sounds that accompany one beat of the organ from all those sounds which belong respectively to the beats before and after. And thus one has only to find out whether the " bruit " is separated by the pause from the following first sound or from the previous second sound. In the former case it is a " *diastolic,*" in the latter case it is a " *presystolic* " bruit.

But not unfrequently the bruit is prolonged, and occupies nearly the whole pause. It may then be separated by no longer an interval from the second (or even the first) sound before it than from the first sound after it. Now if such a bruit be localised at the apex, if the second sound at the base be clear, and if the bruit be of the peculiar " churning " or " grinding " quality, it may safely be asserted to be a " *direct mitral* bruit," and to be caused by an hypertrophied auricle forcing blood through a narrowed mitral orifice. The name of " *auricular systolic* " may also be justly applied to such a bruit, but it cannot strictly be called *presystolic.* It ought rather to be called *diastolic,* quoad

its rhythm; and thus Dr. Gairdner[1] speaks of the murmur of mitral obstruction as sometimes " *ventricular-diastolic*," as well as " *auricular-systolic*." Further on, I shall have something to say as to the way in which such a prolonged direct mitral murmur is produced. But I wish here particularly to insist on the fact that I have found great bewilderment to arise in the minds of students from the careless application of the name *presystolic* to such murmurs, occupying nearly the whole pause. There can be no doubt, I think, that this name will ultimately supplant all others as the designation for the murmur caused by contraction of the mitral orifice. But when it is used for all such murmurs without exception one ought to clearly understand and to explain that its strict meaning is departed from, and that the question of rhythm is then really overlooked and supplanted by other and secondary considerations.

To two of the considerations which come into play under such circumstances I have already referred :—the localisation of the bruit at the apex, and its peculiar churning or grinding quality. But there is yet another character which belongs to a large number of cases of contraction of the mitral orifice ; this is the extreme variability of the rhythm of the heart itself, and of the murmurs which accompany its movements. The variations in question may show themselves from beat to beat. One beat may have a short murmur, evidently presystolic ; the next may be preceded by a prolonged bruit, which may occupy nearly the whole pause, and might thus excite doubts as to its nature in the mind of an unpractised auscultator. In other cases the heart is apt to change its rhythm from time to time suddenly and without apparent cause. And thus whereas during one minute each beat is preceded by a most obvious presystolic bruit, the next minute no such bruit may be discoverable. Further on in my paper I shall have to discuss this point in considerable detail. I refer to it now, because several writers have most justly laid considerable stress upon variability of the heart's rhythm as a point in the diagnosis of contraction of the mitral orifice.

Another character which is observed to belong to many presystolic bruits is that of being brought out, or greatly increased, when the patient is made to undergo even moderate exertion. I

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[1] Op. cit., p. 453.

have more than once found that a direct mitral bruit, which was inaudible while the patient was sitting by the side of the bed, was perfectly obvious on his or her return from walking once or twice briskly up and down the ward.

When a direct mitral murmur is so prolonged as to be in fact diastolic in rhythm, it sometimes seems as if it grew out of the second sound. At the base, the second sound is clear, or perhaps appears to be reduplicated. As the stethoscope is carried downwards the double sound acquires more and more the character of a murmur, until at the apex it becomes the harsh, churning bruit so characteristic of mitral contraction. At first sight the fact just mentioned might appear fatal to the presystolic theory; it is nevertheless indisputable. Friedreich has already described this transition of the reduplicated second sound into a presystolic murmur in cases of contracted mitral. I have myself noted it more than once, and my observations are perfectly independent, since they were made at a time when I did not even know that a reduplicated second sound had been mentioned as one of the signs of this affection.

I shall subsequently have to discuss the cause of such an occurrence, and at the same time to speak of certain complex sounds, which are very much more rare than the presystolic bruit, but which appear to be also caused by contraction of the mitral orifice.

So far as the English language is concerned, the literature of this subject may almost be said to have commenced, in 1861, with the publication of Dr. Gairdner's lecture already more than once referred to. But in France opinions precisely similar to his had been promulgated eighteen years before, by M. Fauvel, in a paper published in the 'Archives Générales'[1] for 1843. This is a brief communication, consisting of only sixteen pages; but nevertheless it may be read with the utmost interest by the physician of the present day; and, while it contains much that is still novel, there is in it perhaps nothing inconsistent with the results of the most modern research. As this paper has, so

[1] " Mémoire sur les signes stéthoscopiques du rétrécissement de l'orifice auriculoventriculaire gauche du cœur."—Par A. Fauvel, Chef de Clinique de la Faculté de Médecine à l'Hôtel-Dieu, &c., ' Arch. Gén.,' 4e série, tome i, p. 1 .

far as I know, been noticed in detail by no English writer,[1] I believe that it will be well for me to give an abstract of the chief points which are stated in it.

The memoir commences with a short historical résumé; very short, for the art of auscultation itself was then in its infancy. A meed of praise is, however, awarded to Laennec and to Bouillaud, and then to the discovery of insufficiency of the valves by Corrigan, and to the localisation of abnormal bruits by Hope, by Barth and Roger, and by Skoda.

Fauvel next passes to the matter in hand, the diagnosis of mitral contraction, the characteristic sign of which lesion was, he says, stated by authors to be a diastolic murmur. But M. Beau had asserted the statement in question to be a pure hypothesis unwarranted by observation; for the records of science might be searched in vain for a single fact in its support.

Hope had maintained a diastolic bruit caused by mitral constriction to be extremely rare, and Barth and Roger had agreed with him. The former writer had even declared that he had heard a systolic murmur in certain cases in which that lesion existed.

Fauvel next lays down the stand-point from which he had himself approached this question—a stand-point of pure observation, based solely on facts admitted by all observers.

Several times it had occurred to him to observe, as M. Gendrin had already pointed out, that in certain cases a murmur accompanying the first sound preceded the beat of the heart; but to this he did not then attach much importance.

In the course of the previous year (1842), however, his attention was especially drawn to this subject. A man aged twenty-five, who presented all the symptoms of organic heart disease, was admitted into the Hôtel-Dieu for subacute rheumatism. In the præcordial region there was heard an intense, rasping bruit, preceding the first sound and terminating with it. This patient was discharged cured of his rheumatism.

Very soon afterwards four similar cases came under his observation, three of which terminated fatally, so that in each of them he was able to control his diagnosis by an autopsy.

CASE 1.—A woman, æt. 50, admitted with right hemiplegia. On auscultation a rather loud, rasping murmur was heard,

[1] Dr. Gee, in his recent work on ‘Auscultation and Percussion,’ 1870, duly attributes “the explanation of the significance of presystolic murmurs” to Fauvel.

having its maximum of intensity at the level of the fifth rib, to the left of the nipple. This murmur commenced in the pause following the second sound, and terminated at the instant when the first sound was heard. It diminished in intensity towards the right and towards the base of the heart. The pulse was small, intermitting and irregular. There was no œdema. After the patient's death the mitral orifice was found to be so narrowed as to scarcely allow the passage of the index finger. The convolutions of the left hemisphere contained " cysticerci."

CASE 2.—A woman, æt. 32, suffering from puerperal metritis, with a pulse of 120. On auscultation there was heard over the præcordial region a rough (*rugueux*) murmur, commencing before the first sound, and terminating with it, so as to give it a very hoarse character (*un timbre fortement enroué*). This murmur was loudest at the apex. The patient died three or four weeks later; before death the bruit preceding the first sound presented some irregularities in regard to its intensity. The mitral orifice was found to be so narrow as not to admit the extremity of the little finger.

CASE 3.—A woman, æt. 35, admitted into the Hôtel Dieu with erysipelas. On auscultation a marked rasping murmur was heard preceding and obscuring the first sound at the apex of the heart and to the left of it. At the base another rasping murmur, following the first sound, was audible. After death the mitral orifice was found to be funnel-shaped, and so narrow as scarcely to admit the finger. The aortic valves were also thickened and narrowed.

CASE 4.—A man, æt. 32, suffering from cardiac dropsy, with much oppression of the chest. A rasping murmur was heard, commencing immediately after the second sound, and running up to the first sound.

After relating these cases, Fauvel goes on to discuss the question as to the distinction between the murmur which he has described, and the ordinary diastolic murmur of aortic regurgitation. Both occupy " *le grand silence ;* " but the latter dies away toward the first sound, whereas the former becomes more and more intense, until it terminates with the beat of the heart. This all takes place very rapidly, but in such a way that the ear attributes the morbid bruit to the first sound,

shortening " *le grand silence.*" In every case the bruit has appeared to have a more or less marked rasping character, and to communicate a hoarse quality to the first sound. The *cadence* is quite different from that of a diastolic murmur; and no one practised in auscultation will mistake it.

The next point is to explain the origin of this murmur. All physiologists admit that the auricular systole is the immediate precursor of the ventricular. This, then, is the cause of the murmur. Writers on the subject of contraction of the mitral orifice have attributed too great influence to the dilatation of the ventricles, and have too much neglected the contraction of the auricles. Does it follow that, because the healthy auricle contracts with but little energy, the same must be true when it is diseased? Is it not reasonable to suppose, that the auricle will contract with more force, being placed behind the obstacle?

Every one knows how common among cardiac affections is contraction of the mitral orifice; and that of all such affections it is the one which most commonly escapes diagnosis, unless it is accompanied by alarming symptoms. It must therefore be of great clinical value to be able to determine by the above-described physical sign the existence of such a lesion in an early stage, when its consequences may perhaps be averted by therapeutical means.

In the last paragraph of his important paper M. Fauvel sums up as follows:—" I conclude from the facts stated in this memoir that a morbid presystolic [1] bruit localised at the apex of the heart is, in the existing state of science, the stethoscopic sign which points with the greatest probability to contraction of the mitral orifice. I do not say a certain sign; for the facts on

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[1] " I borrow the expression from M. Gendrin, while admitting that he used it in a different sense."

As Gendrin has been accredited with having originated the theory of presystolic mitral murmurs, it may be well to state that as far as I can ascertain he has no claim to such credit. He invented the name " presystolic," as one of six names, " presystolic, systolic, perisystolic, prediastolic, diastolic, peridiastolic," by which he proposed more precisely to indicate the rhythm of cardiac murmurs; but I have searched his work ('Leçons sur les Maladies du Cœur,' &c., 1841-42) in vain for any indication that he attached a special importance to the præsystolic murmur, or associated it in any way with contraction of the mitral orifice.

C. H. F.

which this conclusion is based are so few that it can as yet only be regarded as provisional, and as needing to be confirmed by new observations."

I have quoted in so great detail this memoir, published twenty-seven years ago, because it seems to me a matter of great interest to find how completely Fauvel anticipated the English writers who have since occupied themselves with this subject.

But so far as I can ascertain, the views of Fauvel have received very little acceptance in his own country. The next French memoir on the diagnosis of mitral contraction appears to be one by M. Hérard.[1] The object aimed at by its author is to show that this disease may produce, with varying degrees of frequency, a *bruit de souffle*, either systolic, presystolic, or diastolic; and that sometimes, especially in old people, it is attended with no morbid sound whatever. These comprehensive opinions are supported by an array of cases, in each of which the mitral orifice was found to be narrowed after death, whereas during life the stethoscopic signs had varied in the manner indicated.

It is, however, very difficult to trace in detail the opinions of French writers on this subject, because in that country contradictory views were maintained by different observers in reference to the most elementary fact in the physiology of the heart. During many years it was asserted by M. Beau that the heart's impulse coincided, not with the contraction, but with the dilatation of the ventricles. So long as this notion remained unrefuted, it must obviously have made agreement on minor points impossible; and it would appear that the fundamental fact on which M. Beau based his opinion, and which indeed led to its conception, was the clinical observation that mitral contraction was so often found after death when a systolic murmur had been heard during life; whereas no recorded case could then be brought forward in which this morbid change had produced a diastolic murmur. Now, since Fauvel, equally with Beau himself, denied the diastolic character of the direct mitral

[1] " Des signes stéthoscopiques du rétrécissement de l' orifice auriculo-ventriculaire gauche du cœur, et spécialement du bruit de souffle au second temps " (' Arch· Gén. de Méd.,' sér. v, tom. ii, 1853, p. 543).

murmur, Hérard appears to have classed Fauvel among the followers of Beau, and thus great confusion arose.

Hérard, indeed, although he admitted that contraction of the mitral orifice might occasionally produce a *presystolic* bruit, limited the application of this term to murmurs instantaneously followed by the first sound, and expressly stated that in two of Fauvel's cases the bruit ought to have been called *diastolic*.

Nor did M. Bouillaud, probably for many years the highest authority on heart diseases in the French capital, admit the theory of Fauvel. He had himself some time before [1] described as characteristic of mitral contraction a peculiar triple bruit at the heart's base, to which bruit he gave the name of the " bruit de rappel." In 1854, four cases from his clinique, in each of which a diastolic bruit had accompanied the lesion in question, were published by M. Lemaire.[2]

Nothing can better indicate the views which seem to have prevailed in the Paris school up to the present time than the fact that in 1862 Duroziez [3] thought it sufficient to make a passing reference to " ce fameux bruit présystolique, dont tout le monde a parlé, sur lequel personne ne s'entend, que Hope lui-même avoue n'avoir jamais entendu,[4] que M. Bouillaud enfin néglige et même nie."

So, again, in his 'Traité de Diagnostic Médical,'[5] M. Racle speaks of the " bruit de souffle présystolique " as " une distinction plus subtile que réelle, à notre avis, une sorte de terrain neutral ou tous deux " (M. Bouillaud and M. Beau) " peuvent exister à la fois sans se nuire." A little lower down he says, " Suivant cette manière de voir, ce souffle présystolique ne serait rien autre chose que ce que l'on a pris jusqu' à présent pour un souffle au premier temps . . . . Si l'on a déja bien de la peine à reconnaitre qu'un bruit se passe au premier ou au second temps

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[1] 'Traité Clinique des Maladies du Cœur,' 1836. I shall have occasion to refer to this bruit in a later part of this paper.

[2] " Quatre cas de souffle au second temps à la pointe du cœur, coincidant avec un triple bruit."—'Union Méd.,' April, 1854.

[3] " Du Rhythme Pathognomonique du Rétrécissement Mitral," 'Archives Gén.,' sér. v; tom. xx, p. 385.

[4] I do not know how this statement is to be brought into unison with the fact that Dr. Hope died in 1841, two years before the publication of Fauvel's memoir.

[5] 2ème éd., 1859, p. 290.

du cœur, il doit être encore bien plus difficile de déterminer si ce phénomène se passe exactement avant le premier temps, c'est à dire dans la présystole."

These quotations appear to me to indicate that neither Racle, nor Duroziez, nor Hérard, nor even Bouillaud himself, ever comprehended the full significance of the presystolic doctrine as we in England now comprehend it.

In Germany very little notice appears to have been taken of the views of Fauvel; at any rate I have looked through the index of Schmidt's ' Jahrbücher ' for some years without finding any reference to the subject.

In 1848, indeed, Canstatt published an essay[1] on the ' Diagnosis of Organic Affections of the Mitral Valve,' in which he propounds opinions very similar to those of Fauvel, to whom, as well as to Gendrin and to Beau, he moreover admits his obligations.

In this essay he speaks of the murmur in cases of contracted mitral orifice as beginning during the pause and running up to the first sound, and as being accompanied by a frémissement cataire more frequently than the murmur of any other organic heart affection.

So far he agrees with Fauvel. But, believing that the auricular systole is instantaneously followed by the ventricular, he includes both movements in the " first tempo " of the heart; and thus he speaks of the murmur above referred to as *systolic.* It is, therefore, a mistake, he remarks, to regard a murmur falling in the heart's " first tempo " as always indicative of insufficiency of the mitral valve.

A year later Dr. M. A. Wintrich published[2] a criticism of Canstatt's theory. In this communication he also refers in considerable detail to the views of Gendrin and Fauvel, whom he follows so far as to designate the direct murmur *presystolic,* and to declare that a presystolic murmur is the surest sign of contraction of the mitral orifice (or, at least, of roughening of

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[1] ' Klinische Rückblicke und Abhandlungen,' Erlangen, 1848. I have not had an opportunity of consulting this work ; and know it only by the references to it in the writings of Wintrich and P. Niemeyer.

[2] " Fragmente zur physikalischen Diagnostik," ' Archiv f. phys. Heilkunde,' Jahrg. viii, 1849, pp. 10, 399.

the auricular face of the valve). He thinks, however, that this murmur can very rarely be recognised during life, and that when it exists it always runs on into a systolic and perisystolic murmur. Finally, he dismisses it as a rather interesting *article de luxe* of physical diagnosis !

On the other hand, he says that he has in his note book fifteen cases in which contraction of the mitral orifice led to a diastolic bruit; six of which were verified by post-mortem examinations.

In criticising Canstatt's statements, Wintrich points out a remarkable inconsistency in them. The former writer stated in one place that the erroneousness of supposing the direct mitral murmur to replace the second sound is shown by the fact that in cases of contracted mitral the " *second sound* " is peculiarly sharp (klackend). Elsewhere, however, he spoke of this very " *klackton* " as proving that the mitral valve was competent; in other words he spoke of it as the " *first sound.*" I have already stated that in cases of contracted mitral orifice the first sound is often mistaken for the second; and I shall subsequently express my belief that this has been the cause of a large part of the confusion which has existed in reference to this subject. The inconsistency in Canstatt's statements as to this very point is therefore highly interesting.

I am not aware that since the appearance of Wintrich's 'Fragmente' any German paper has been published on the question of the presystolic bruit. The subject is referred to by some writers on heart diseases, but not usually at great length. It may be sufficient for me to quote from the works of Felix von Niemeyer, Friedreich, Oppolzer, and Paul Niemeyer.

Felix von Niemeyer (of Tübingen), in his well-known text book,[1] says that " contraction of the mitral orifice causes a slight presystolic frémissement cataire (præsystolisches Katzenschnurren), and that on auscultation there is almost constantly heard at the apex, during the diastole, a long-drawn-out bruit, occupying nearly always the whole pause up to the next systole. Traube therefore terms a præsystolic bruit at the apex pathognostic of mitral stenosis."

Friedreich [2] says with regard to Gendrin's division of morbid

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[1] 'Lehrbuch der spec. Path. u. Ther.,' 7te Aufl., 1868, p. 400.

[2] " Krankheiten des Herzens," 'Virchow's Handbuch,' 1867.

bruits that " the knowledge of presystolic murmurs is of importance, because sometimes in stenosis of the left auriculoventricular orifice the murmur is audible only during the moment of the active contraction of the auricle."

In another place, at p. 247 (while referring to the diagnosis of mitral stenosis), he speaks of *diastolic* murmurs, and of the diastolic *frémissement ;* and he describes the " first sound of the left ventricle " as not being clear in most of these cases, and as more or less dull (dumpf). Afterwards he goes on to say that the murmur in some instances is presystolic in character, and that in a third class of cases there may be heard " a more or less distinct, often rather dull (dumpf) or reduplicated (gespalten) diastolic tone, which not unfrequently can at once be converted into a distinct diastolic murmur when the patient is made to walk up and down, so as slightly to accelerate the heart's action." Thus in all essential particulars Friedreich's account accords with Fauvel's and the modern English views; and it is worthy of note that he lays especial stress on the importance of using the carotid pulse as a means of determining the ventricular systole.

On the other hand, Oppolzer, the great Viennese teacher of clinical medicine, would seem never to have heard of the presystolic murmur. He describes contraction of the mitral orifice as causing a diastolic murmur, with a diastolic frémissement of great or less intensity, these signs being superadded to the systolic murmur arising from insufficiency of the valve. The diastolic murmur is very often wanting; it may be present and disappear alternately. Exertion has a marked effect in increasing the murmur or bringing it out; even walking a few steps may suffice. Another condition which may make such a diastolic murmur disappear is, according to Oppolzer, a deficiency of blood (anæmia); the murmur returning as this condition is removed.

But the most recent German work on auscultation is that of Dr. Paul Niemeyer[1] (of Magdeburg). After a most elaborate account of the views of successive French and German and English writers (to which, indeed, I have been greatly indebted for references), Dr. Paul Niemeyer sums up the matter as follows :—

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[1] 'Handbuch der theoretischen und clinischen Percussion und Auscultation,' Band ii, Abtheilung i, Erlangen, 1870.

1. The "bruit présystolique" is a rough (crepirt) diastolic murmur.

2. A diastolic murmur at the mitral orifice occurs only exceptionally.

3. Stenosis (of the mitral orifice) is always attended with insufficiency (regurgitation).

Finally, as diagnostic of contraction of the mitral orifice, he gives "*Disordered rhythm—systolic, long, loud (polternd) murmur over the heart's apex—strong 'frémissement cataire:'*—in rare cases also, *short diastolic murmur.*"

No one, I think, can read this without concluding that in spite of his identifying the "bruit présystolique" *in theory* with a diastolic murmur, Dr. P. Niemeyer must *in practice* have always mistaken it for a systolic murmur.

It remains for me to trace, as far as I can ascertain it, the development of the presystolic theory in Great Britain; and I believe that most English practitioners regarded Dr. Gairdner as the discoverer of a new fact in medicine, when, in the year 1861, he published the paper already so many times referred to, in which he declared that the direct mitral murmur comes before the natural "first sound" of the heart, and is caused by the systole of the auricle immediately preceding that first sound. Dr. Gairdner himself does not indeed put forward any claim to be regarded as an original discoverer of the point in question; and it is certain that the lucid statement of facts contained in his paper and the method of diagrammatic representation invented by him have aided powerfully in rendering Fauvel's doctrine generally intelligible and accepted. Dr. Gairdner does not call the murmur a presystolic, but prefers to term it auricular-systolic. He refers in more places than one to the peculiar rough and churning quality of the murmur in question; but I think he only mentions incidentally that it is very often accompanied by a thrill perceptible to the touch—thus apparently not regarding this thrill as more frequently felt with auricular-systolic than with ventricular-systolic murmurs. It is important to note, however, that he expressly states the murmur of mitral obstruction, besides being auricular-systolic in rhythm, to be occasionally also ventricular-diastolic.

In his ' Clinical Medicine,'[1] Dr. Gairdner gives an account of seven (or possibly eight) cases, in each of which an auricular-systolic murmur was heard, and which all came under his observation in a period of three months. In two of these the diagnosis was verified by autopsies.

It is not, indeed, strictly accurate to say that, up to the time of the publication of Gairdner's views, English physicians and writers on diseases of the heart had entirely overlooked the presystolic character of the direct mitral murmur. But, at any rate, Hughes (1845, 1854), Latham (1845), H. Davies (1851, 1854), Bellingham (1853), and Markham (1854, 1860) all speak of this murmur as simply diastolic. Several of these writers also describe it as very rare. Thus Latham is said to have spoken of it as a sort of clinical curiosity; and Davies terms it a pathological curiosity. Dr. Markham, who had previously[2] published an essay on this very subject, writes[3] in 1860 that during the last eight or nine years he had not met with more than a dozen cases in which he could with certainty diagnose its existence.

It is, however, evident from the way in which Dr. Markham speaks of the " diastolic mitral murmur," that although he did not use the word presystolic, he was in fact familiar with its peculiar rhythm. " In well-marked cases of diastolic mitral murmur," he goes on to say, " and when the heart's action is still vigorous, a loud and prolonged murmur is heard at the apex of the heart, and from thence upwards to the left of the nipple; this is often attended with a vibratile thrill—*frémisse-ment cataire*—perceptible at the heart's apex. The murmur is sometimes so prolonged as to occupy not only the whole natural period of the diastole, but also the interval of repose, and a part of the time of the systole of the heart. The impulse, in fact, appears to follow immediately upon the cessation of the murmur, or rather to be its conclusion, and to wind it up ; it is brief and rapidly accomplished, and, after a very short pause, is followed by another murmur."

The principal case recorded in Dr. Markham's paper in the

[1] Edinburgh, Edmonston and Douglas, 1862, p. 597.

[2] "Remarks concerning the Diastolic Mitral Murmur," ' The Monthly Journal of Medical Science,' 1854, xviii, p. 26.

[3] ' Diseases of the Heart,' 1860, p. 122.

'Monthly Journal' was that of a girl, æt. 17, in whom the murmur presented these characters; he speaks of the murmur as *preceding the beat.* In his second case also he says, "the bruit *immediately preceded* the *heart's impulse,* this seeming to conclude it."

So far as I am aware, Dr. Walshe[1] is the only English writer who, during the period from 1843 to 1862, spoke of the direct mitral murmur as "presystolic." The passage in which this word occurs is, however, placed under a heading entitled "*Diastolic basic murmur at the left apex.*" "This," he says, "indicates obstructive narrowing of the mitral orifice or simple roughness." . . . I have never heard this murmur of great intensity nor high pitch; it is, however, sometimes prolonged. It is rarely loud enough to cover the second sound completely, even at the left apex. This murmur is commonly spoken of as diastolic in rhythm; but in point of fact it is rather post-diastolic, or præsystolic, than precisely coincident with the diastole. This murmur is not infrequently wanting. . . . I have known it come and go from day to day." . . .

I must not, however, omit to mention Dr. Stokes, who does indeed allude[2] both to *pre*-systolic and *post*-systolic murmurs. But this writer attaches very little practical value to the precise rhythm of the heart sounds in disease, which he finds to be very difficult of determination. "So great is the difficulty that we cannot resist altering our opinions from day to day as to which is the first and which the second sound. . . . In the ordinary cases of mitral murmur we cannot say whether the murmur is 'constrictive' or 'regurgitant,' or constrictive and regurgitant." This candid statement of Dr. Stokes is very interesting, for (as I have already more than once stated, and as I shall hereafter endeavour to prove) I believe that the observers of this period generally, as a matter of fact, did mistake for systolic the murmurs which we now know to be presystolic, and moreover in such cases took the true first for the second sound.

This is perhaps the proper place to refer to the work of the well-known American writer, Dr. Austin Flint.[3] In this book,

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[1] 'A Practical Treatise on Diseases of the Heart,' &c., Third Edition, 1862, p. 103.
[2] 'Diseases of the Heart and Aorta,' Dublin, 1884, p. 180.
[3] 'Practical Treatise on the Diagnosis, Pathology, and Treatment of Diseases of the Heart,' Philadelphia, 1859.

published three years before Gairdner's lecture appeared, Dr. Flint designates the direct mitral murmur diastolic, but observes that it is more accurately called presystolic. There is reason to believe, he says, that it is less rare than has been supposed. He does not associate the "purring thrill" more with constrictive than with regurgitant disease of the mitral valve.

After the publication of Dr. Gairdner's views, the earliest reference to this subject which has come under my observation occurs in the 'Medical Times and Gazette,'[1] where some clinical remarks made at Guy's Hospital by Dr. Wilks are quoted, based on the post-mortem examination of a patient with contracted mitral orifice, in whose case a presystolic murmur had been repeatedly pointed out by Dr. Gull.

The same volume of the 'Medical Times and Gazette' at p. 275 contains a clinical lecture by Dr. Gairdner on a similar case, in which likewise the diagnosis was verified by an autopsy. Another fatal case, in which the post-mortem also showed the disease that had been asserted to exist during life had been published by the same writer[2] in the year 1864.

Dr. Blakiston[3] about this time stated that "the chief physical sign of mitral obstruction is a diastolic murmur. It is rarely, however, that such a murmur is developed."[4]

In 1866, the 'Medical Times and Gazette'[5] contains reports of two cases which had been in Guy's Hospital, the one under Dr. Rees, the other under Dr. Gull. In each case an auricular-

[1] 1865, i, p. 198.

[2] 'Med. Times and Gazette,' 1864, ii, p. 460.

[3] 'Clinical Observations on Diseases of the Heart and Thoracic Aorta,' 1865, p. 246.

[4] The only other writer who, since the publication of Dr. Gairdner's views, has spoken of the murmur of contracted mitral orifice as diastolic, appears to be Dr. Fuller, ('On Diseases of the Heart and Great Vessels,' 1863, pp. 55, 113). He describes the "diastolic mitral murmur as not frequently met with alone," and as "comparatively rare even in cases of considerable constriction of the mitral orifice." In another place he says that (among the different valvular affections) "obstruction of the mitral orifice is comparatively rare. It necessarily induces dilatation of the left auricle, and not unfrequently hypertrophy also, with presystolic auricular impulse." I cannot find any reference to the presystolic murmur.

[5] Vol. i, p. 90.

systolic murmur was heard during life; in each the mitral orifice was found by Dr. Moxon to be contracted.

The next paper on the subject was, I believe, one by Dr. Hayden,[1] of the Mater Misericordiæ Hospital in Dublin, based upon clinical lectures delivered by him in June, 1865. Dr. Hayden gives an account of seven cases of mitral obstruction, in all but one of which a præsystolic[2] murmur was heard. In the undiagnosed case the patient was suffering from cerebral complication, and was in a state of extreme debility when seen by Dr. Hayden. Of the remaining six cases three terminated fatally; and the post-mortem examination in each instance confirmed the diagnosis.

It is worth noting that in three of the seven cases it is distinctly stated that the patient had never had rheumatism; in a fourth case no reference is made to this point.

Dr. Hayden lays it down as a rule that in cases of mitral obstruction the respiration is much less embarrassed, and the dropsical effusion less general and less considerable than in cases of mitral regurgitation. However, he states the heart's action to be quick, weak, and markedly irregular; and he lays particular stress on the fact that in two of his cases the radial pulse was imperceptible for a considerable time before death (once for 120 hours, once for 72 hours). In this paper it is mentioned that " the presystolic murmur is not transmitted save occasionally to the left side of the lower dorsal spine."

In the year 1867, Dr. Peacock gave in his adhesion to the new views.[3]

Dr. Peacock's paper contains reports of two fatal cases, in both of which a presystolic murmur had been diagnosed during life. He sums up by agreeing with Dr. Gairdner that such murmurs are of not infrequent occurrence; but he cannot admit with him that " they are among the most easily detected of all the cardiac murmurs." He rather unites " with Dr. Andrew in regarding the diagnosis of a presystolic murmur as among the most difficult tasks in the physical examination of the heart, at

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[1] ' Medical Press and Circular,' July, 1866.

[2] Dr. Hayden states that he prefers this term to that of auricular-systolic, but does not give any indication as to the source from which he derived it.

[3] " On the Diagnosis of Obstructive Disease of the left Auriculo-ventricular Aperture," ' Med.-Chir. Review,' vol. xl, p. 489.

least in the latter periods of the disease." It is worthy of note that in describing the effects of mitral obstruction on the lungs, Dr. Peacock expressly lays it down that the pulmonary vessels undergo gradual dilatation, and apoplectic extravasations therefore do not readily occur. This statement may be compared with the opinion expressed by Dr. Hyde Salter, that the affection in question is more than other heart diseases apt to produce hæmoptysis.

In the fourth volume of the 'London Hospital Reports' (1867-8, p. 297) Dr. Sutton[1] has made "Some Remarks on Mitral Presystolic Bruits." In this paper a detailed account is given of one previously unpublished fatal case. It occurred in a man, æt. 37, who had had rheumatic fever, and who came under Dr. Sutton's care on three separate occasions. A very important fact was noticed on the last occasion, namely, that the murmur was inaudible during the greater part of the time that the patient was in the hospital. He was then very much weakened by frequent vomiting. As the vomiting abated he regained his strength, and the murmur reappeared. Before death, however, it was again inaudible. The mitral orifice admitted the tip of one finger with difficulty. Dr. Sutton adds that during two years twelve cases had come under his notice, in each of which a harsh grating presystolic murmur had been heard.

In 1868, Dr. Simpson, of Manchester, read before the Medical Society of that town a paper on this subject, which was afterwards published in the 'British Medical Journal.'[2] He gives notes of three fatal cases, each verified by an autopsy. All these patients were women, and two at least had had acute rheumatism. The third died soon after admission, and before a history of her case had been taken.

We next come to a lecture "On Presystolic Murmurs," by Dr. Hyde Salter, F.R.S., published in the 'Lancet,' 1869, vol.

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[1] I believe that Dr. Sutton also collected for the 'Medical Times and Gazette' the notes of the cases which occurred in Guy's Hospital during the years 1865 and 1866. At that time Dr. Sutton was a frequent visitor at the hospital, and did much to concentrate interest on this subject. For myself, I must add that Dr. Sutton first drew my attention to the peculiar rhythm of the bruit in question.

[2] 1868, i, p. 474.

ii, pp. 565, 601. In this lecture there are described six cases, in each of which a presystolic murmur was heard; and in two of these the diagnosis was confirmed by post-mortem examinations. In four at least of these cases the patient had had rheumatic fever.

Dr. Salter's account of the matter does not differ very much from that of previous writers; but it may be noted that in all his cases " the murmur was terminated sharp by a natural first sound." The murmur itself he generally describes as of a " grinding" quality. He maintains that of all valvular lesions mitral constriction is the most productive of hæmoptysis.

A considerable part of his lecture is devoted by Dr. Hyde Salter to the consideration of those cases in which the direct mitral murmur begins unusually early, occupying the entire pause. Either, as he justly remarks, the auricular systole must in such cases commence earlier and be sustained longer than natural, or the murmur must be generated even while blood is flowing passively from the auricle into the ventricle. In favour of the former view it may be urged that when the mitral orifice is narrowed, we should expect the auricle to take a longer time than usual in expelling its contents; and Dr. Salter has observed that in cases of aortic narrowing the systole of the ventricle is excessively prolonged; but he finds a difficulty in understanding how, if the auricular contraction is thus prolonged, there can be time for the auricle to get filled from the veins. I confess that this difficulty does not seem to me by any means a serious one; and for my own part I have always believed that, when a presystolic murmur follows close upon the second sound, the auricular systole likewise commences prematurely.

With regard to the detection of a presystolic murmur, Dr. Salter speaks very strongly. He thinks it is the easiest to recognise, the most certain and unmistakeable, of any murmur whatever. But it is perhaps going a little too far, even in addressing a class of students, to say that now any one who should fail to recognise and identify this sound would not only be unfit to hold the place of an accomplished and critical physician, but could hardly be considered a decently informed member of our profession.

I now propose to run over, as briefly as possible, the cases of mitral contraction which came under observation in the wards or in the post-mortem room of Guy's Hospital during the period in which I acted as Medical Registrar; and I owe to all the physicians and to my colleagues, the assistant-physicians, the expression of my warm thanks for the kindness and courtesy with which (on this as on former occasions) they have allowed me to avail myself of the reports of cases that had been under their care.

The cases will naturally divide themselves into three heads:—

1. Cases in which a direct mitral or presystolic murmur was heard during life, and in which the mitral orifice was found after death to be contracted.

2. Cases in which the mitral valve or orifice was found after death to be narrowed, but in which no presystolic murmur had been heard during life.

3. Cases in which a presystolic murmur was recognised by auscultation, but in which no opportunity was afforded of verification by post-mortem examination.

The cases which come under the first head amount to six, or perhaps seven. Those which are placed under the second head are forty in number. Those which I have collected under the third head amount to nineteen; but it is possible that this number is somewhat too small.

On the other hand, it is certain that a large deduction has to be made from those which come under the second head, in the attempt to estimate the practicability of diagnosing mitral contraction during life. Not a few of the patients died within a few hours after their admission into the hospital; and some, in the surgical wards, of necessarily mortal injuries. It is obvious that these cases cannot fairly be taken into account for the purpose indicated.

1. Cases in which a presystolic murmur was heard during life, and in which the mitral orifice was found after death to be contracted.

These cases are six, or perhaps seven[1] in number; I give them in full detail.

In five of them the first sound was perfectly clear and sharp; there being no evidence of coexisting regurgitation through the mitral orifice. I will take these cases first.

In one case the presystolic murmur was followed by a distinct systolic (regurgitant) murmur.

CASE 1.—*Presystolic bruit, and diastolic bruit. No history of rheumatism. Embolism (?) of lower limb. Death. Contraction of mitral valve, and slightly of aortic valves.* (This report is based upon that taken at the time by Mr. J. H. Ross, Medical Ward Clerk.)

Joseph S—, a labourer, æt. 43, came, on November 29, 1867, as an outpatient under the care of Dr. Pavy, who admitted him into Philip Ward under Dr. Rees. He stated that he had been in good health until seven weeks before, when he was taken with a bad cough, spat blood, and got swelling of the bowels. His breath was also very short. He went to a doctor, but obtained no relief. He had never had rheumatic fever.

On his admission his legs were œdematous. There is no note of the physical signs observed at this time. He was ordered to take a mixture containing infus. digitalis ʒj, tinct. hyoscyam. ʒss.

On December 5th his symptoms were relieved; there was then neither ascites nor anasarca. On that day the following notes were made: "The heart's rhythm is very irregular; the impulse diffused; the apex-beat felt between the sixth and seventh ribs. There is a presystolic bruit, heard loudest below the nipple; no bruit audible on the back.

"I think there is also a very soft bruit following the second sound over the aorta; and this renders it difficult to be sure of the rhythm of the sounds at the apex. The bruit at the apex, however, certainly seems to me to precede the first sound; it is harsh, and far louder than the bruit over the aortic valves."

The subsequent history of the case need not be detailed here. The murmurs appear from the report to have varied in loudness

[1] The uncertainty lies in the fact that in reference to Case 7 a difference of opinion existed between the physicians who examined the patient; some thinking that the murmur was presystolic, others that it was systolic.

on different occasions; but I distinctly remember that the case was regarded as one in which there was a typical presystolic murmur, the subject being one in which I had not long before begun to take much interest. The pulse was slow, being noted once at forty-four in the minute, at another time at fifty-two.

On December 7th he complained much of pain in the calf of the right leg; and this was probably due to embolism, for the report goes on to say that very little pulsation could be felt in the foot.

On January 6th it is noted that he was confined to his bed; and he died at 3.15 a.m. on the morning of the 9th.

The post-mortem examination was made by Dr. Moxon, from whose report the following abstract is taken:—

There was slight hydrothorax on the right side; the right lung was considerably congested, and tough.

The heart weighed ten ounces; there was considerably more dilatation and hypertrophy of the right than of the left side. The walls of the left auricle, however, were much hypertrophied, being found, on careful measurement, to be a quarter of an inch thick. The appendix was choked with round, half-softened ante-mortem clots.

The mitral orifice was contracted very closely. The point of the little finger would not pass through it. The chordæ were united into a mass, except one of the anterior right bunch, which was free and scarcely altered. The mass so made up of the very short chordæ and of the flaps of the valves had in it two or three small holes.

The aortic valves showed a degree of the same change, the segments being puckered and thickened.

CASE 2.—*Gangrene of leg from embolism of femoral artery. Presystolic sound and slight bruit. No history of rheumatism. Past attack of hemiplegia. Amputation of leg. Death from pulmonary affection. Contraction of mitral orifice.* (From notes made by myself at the time.)

Harriet N—, æt. 47, was admitted into Petersham Ward under the care of Mr. Bryant, on account of a gangrenous affection of one leg, October 1st, 1868. Mr. Bryant wished his

medical colleague to examine and report on the case; and by some accident my name was written down instead of Dr. Moxon's, who should properly have been asked to see it.

On examining the heart, I at first thought that the sounds were perfectly natural; but, on moving the stethoscope from place to place below the nipple, I noticed that at one spot the first sound seemed to be slightly longer than natural. This led me to place my finger on the carotid artery; and I then discovered that this sound was not really the " first sound " at all. The apparent second sound was in reality the " first sound of the heart;" and that which I had taken for a normal or slightly prolonged first sound was, in fact, a morbid sound, a presystolic bruit.

I therefore reported to Mr. Bryant in the following terms: "There is scarcely any evidence of cardiac disease; but I think that at one spot I discover a short *presystolic* bruit. If this is so, the mitral orifice is probably contracted;[1] and a clot formed on the valve, or in one of the heart's cavities, may have been carried into the artery of the lower limb. I do not make out pulsation in the femoral artery in the groin."

On inquiry I found that she had had shortness of breath on exertion during the winter for some years, and winter cough. There was no history of rheumatism. Some time before she had had a " paralytic stroke, affecting all her limbs, so that she could not feed herself nor guide her limbs at all for about three days, and was not able to do anything for a month. The limbs were not numb. The attack was on her at 3 a.m., she having gone to bed well."

This attack of paralysis was probably due to embolism of some one of the cerebral arteries.

My colleague, Dr. Moxon, subsequently investigated the case and agreed with me as to the existence of a presystolic bruit. I also examined the patient on other occasions, always with the same result.

After she had been in the ward for some little time, Mr. Bryant found it necessary to amputate the gangrenous limb. Subsequently to the operation she did very well for a time; but

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[1] My opinon as to the lesion was thus guarded, because at that time I had had only one opportunity of examining the heart after death in a case in which a presystolic murmur had existed during life.

ultimately acute disease of the chest came on, and she died on November 18th.

The frequency of the pulse was carefully registered, and ranged, during the first three weeks after her admission, from 92 to 120 in the minute. The temperature of the body varied considerably, and was on two occasions as high as 100·5°.

On post-mortem examination, it was found that the heart, which appeared to be of the natural size, weighed fourteen ounces. There was no dilatation of the cavities, with the exception of the left auricle, which was much enlarged, especially its appendix. Its muscular wall was also greatly hypertrophied, so as to be in parts one sixth to one fifth of an inch thick. The appendix contained masses of soft polypoid clot, one of which looked very nearly separate from the rest. The mitral orifice was narrowed to the form of a button-hole; one finger-point could just be got into it. Round its auricular edge there were recent vegetations. Some of the chordæ were united, and contained thickish masses. The left ventricle was rather smaller than natural. The aortic valves were healthy.

There was acute pleurisy with extensive effusion; and early lobular pneumonia existed in patches throughout both lungs. In the lower right lobe was a small apoplectic patch of the size of a walnut. There was also acute semi-recent pericarditis with much lymph.

The kidneys were much wasted.

CASE 3.—*Rheumatic morbus cordis with slight systolic bruit. Past attack of hemiplegia. Direct mitral (presystolic or rather diastolic) murmur brought out under the influence of digitalis, shortly before death. Contraction of the mitral and aortic orifices.* (Notes based upon the report taken by the Ward Clerk, Mr. E. E. Cass.)

Jeffrey A—, æt. 30, admitted into Philip Ward under the care of Dr. Rees, March 6, 1869.

" The patient is by trade a baker. About seven years ago he had rheumatic fever; he was ill thirteen weeks. Since that time he has had no return of rheumatic pains, but his breathing has been getting shorter. About eighteen months ago he had

a fit; he was then paralysed on the right side for twenty-four hours, and his speech was affected; afterwards he continued to speak very thickly, although it was then possible to understand what he said. He was ill for four months altogether, before he was able to walk. He has very often spat up dark-coloured blood, and his legs have often become swollen.

" *Condition on admission.*—He is a sallow-looking man. There is no œdema of the legs nor abdomen at present.

" The præcordial dulness commences between the third and fourth ribs and goes down to the eighth, extending from the sternum to two inches to the left of the nipple. The heart's impulse can be felt over a very extensive area; the action of the organ is very irregular. A slight systolic bruit is audible at the base, chiefly with the first beat following a pause, when such has occurred.

" There is good resonance over the lungs. The liver-dulness extends two inches below the ribs. The urine is high-coloured, not albuminous."

Under the treatment prescribed for him (tinct. hyoscyami in aq. camphoræ) he improved for a time, his dyspnœa being relieved, although he was still unable to sleep in the recumbent position. After an interval, however, his difficulty in breathing again became a troublesome symptom.

On March 19th I made a note that " the bruit is very doubtful; the action of the heart is still exceedingly irregular."

On April 4th, in Dr. Rees's absence, it was determined to make trial of the infus. digitalis; and this medicine was therefore ordered in half-ounce doses, which were repeated at first every four hours, and after two days every six hours.

Even by the second day of this treatment, the heart's action and the pulse had become much more regular; the pulse was then 50. The ward clerk observed " a systolic bruit round the nipple, but rather local." In the afternoon he was very sick; and the next morning he became delirious, getting out of bed and wanting to go home. There was also a slight convulsive movement of the left arm and hand.

On the 7th the report says: " His extremities are cold. His breathing, however, is comparatively easy. The carotids can be seen pulsating. Pulse 38. There is a loud, dry, crackling sound with the systolic bruit at the base, not louder

during inspiration." Dr. Rees now stopped the digitalis, and ordered him to take tinct. hyoscyam. ʒj, tinct. lupuli, vin. ferri, ā ʒj, ex mist. camph. every six hours.

On the 8th I examined him, while visiting the ward as medical registrar. I made the following note: "The pulse is 40 to-day. The loud basic bruit runs along the aorta. At the apex the sounds are now very remarkable. The first sound can hardly be said to exist. The heaving impulse is felt, during which time there is scarcely any sound; then comes a sharp, clicking second sound, and after that a churning, thrilling sound, very like a 'presystolic bruit' in quality, but apparently separated from the systole by a slight interval. I, nevertheless, from its quality, believe it to be auricular-systolic in origin.

"He says himself that he is more comfortable than he was before taking the digitalis."

He died the next morning at 2.15 a.m.

The post-mortem examination was made by Dr. Moxon.

The mitral orifice was found to be thickened and narrowed, so that only two finger-points would pass. It had no vegetations.

There was great obstruction of the aortic orifice; two of the segments of the valve were united by their meeting faces.

The left ventricle was of all the cavities the most hypertrophied; it was also dilated. The left auricle was dilated in a degree somewhat exceeding that of the dilatation of the ventricle.

CASE 4.—*Loud presystolic bruit, apparently continuous, towards base, with reduplicated second sound. History of fall on chest, not of rheumatism. Past attack of hemiplegia (? embolism). Death. Contraction of mitral valve; and some thickening of valves on right side of heart.*

Mary Ann R—, æt. 30, was admitted under the care of Dr. Moxon, into the clinical ward, July 17th, 1869. She subsequently came under my care during Dr. Moxon's absence from town; and I then made the following notes of her case:

"As far back as ten years ago, she began to suffer in her heart. She used to come over cold and faint, and her lips used to turn blue. A little before she had tumbled out of a railway

carriage, falling on her chest. A fortnight after this she had a 'fainting fit,' followed by others. Indeed, she has been subject to them ever since. When attacked, she generally remains insensible for five or ten minutes; but sometimes does not altogether lose consciousness.

"As a child she did not suffer from shortness of breath; but could run and play like other children. She has never had rheumatic fever. She has occasionally had pains in her limbs; but she supposed these ' to be weakness.'

" For about three and a half years she has been short of breath. Two months before the birth of her last child she had a paralytic stroke, affecting the left side, and causing the features to be drawn.

" Œdema of the feet and ankles has lately come on towards night.

" She suffers a good deal from palpitation of the heart when she attempts to exert herself. She cannot sweep a room without stopping several times; and she cannot go quickly upstairs."

On admission she was ordered to take mist. quin. t. d. On July 23rd she complained of great pain in the neck, and was directed to apply some linim. saponis. On August 1st it was directed that ferri sulph. gr. j should be added to each dose of the mixture.

On August 7th I made the following notes of her condition:

" The pulse is 84, regular; not deficient either in volume or in force.

" The apex-beat of the heart is rather diffused, but is situated between the fifth and sixth ribs. There is a distinct thrill preceding the systole.

" On auscultation a loud and rather harsh murmur is audible, with a clear and sharp sound. These might be mistaken for a systolic murmur, followed by a second sound; but the clear sound is perfectly synchronous with the heart's systole, while the murmur as distinctly precedes it. The murmur is most loud at the apex, where it is distinctly felt as a thrill. It rapidly becomes less loud as the stethoscope is moved towards the axilla; but it is audible towards the epigastrium. The second sound of the heart cannot be distinguished at the apex.

" At the base the first sound is quite clear; the second is rather leathery. It must be admitted that on carrying the

stethoscope downwards one seems to observe the second sound passing into the presystolic bruit. The sound seems to become double, and then this reduplicated second sound gradually appears to become lengthened out into a murmur, the pause diminishing in length until it becomes less than that between the first and the second sound (upon which of course the presystolic character of the murmur becomes established).

" In the back no murmur can be discovered."

She was discharged from the hospital on August 17th. No further notes of the case appear to have been taken.

She afterwards attended among my out-patients; and on February 19th, 1868, she was readmitted under my care into Mary Ward.

The following notes of her condition were taken at this time by Mr. W. Field Flowers:

" She has been losing flesh lately; and she has had occasional ' fainting fits,' and twice or three times hysterical attacks. She has also suffered from headaches and sickness, weakness and palpitation of the heart. The feet and ankles swell occasionally.

" Her pulse is now 80, very irregular both in rhythm and volume.

" The apex of the heart is about an inch below, and slightly to the left of, a pendulous nipple. The area of præcordial dulness is increased inferiorly and to the left; and there is slight visible pulsation in the epigastrium. On palpation a distinct purring tremor can be felt just before the apex-beat . . . " [The remainder of the report is in fact but a repetition of that made previously, and, therefore, I will forbear to quote it.]

She was ordered to take a mixture containing ammon. carb. gr. v, tinct. senegæ ʒss, infus. senegæ ʒss t. d.; but after four days she said that the medicine did not agree with her, and that her appetite was falling off again. The mixture of iron and quinine which Dr. Moxon had formerly given her was therefore prescribed. Under this treatment she improved considerably, and was discharged at her own request on March 13th. The state of the heart remained unchanged.

On October 4th, 1869, she was again admitted, this time under the care of Dr. Rees, into the clinical ward. She was seen by the house-physician, and by him was not thought to be near

death; but she had several severe fits of dyspnœa, in one of which she died a few hours afterwards. No report was made, but, according to the notes appended by Dr. Moxon to his account of the post-mortem examination, "a murmur was heard at the apex, not judged to be systolic."

Dr. Moxon reports the condition of the heart to have been as follows :

"The organ weighed twelve ounces. There was great hypertrophy of the right side. The right auricle was dilated and hypertrophied ; the right ventricle very thick, but not dilated. The valves on the right side were thicker than natural.

"The left auricle was much hypertrophied ; the mitral orifice would not admit the tip of the little finger. The chordæ were united into two columns.

"The left ventricle was very small.

"There were two white patches on the pericardium."

Case 5.—*Gangrene of foot from embolism of left femoral artery. Presystolic bruit. No history of rheumatism. Partial hemiplegic attack. Death. Contraction of mitral valve. No embolism discovered in cerebral arteries. Remarkable induration of cerebellum.* (From the report of the Clinical Clerk, Mr. William Greaves.)

"Elizabeth C—, æt. 26, was admitted into Guy's Hospital under the care of Dr. Fagge, June 1, 1870, being said to be suffering from 'paralysis.'

"On examination it was found that the supposed paralysis was seated only in the left leg, which was cold, numb, painful and tender on pressure, and round the ankle and foot distinctly swollen and œdematous. The pulsation of the femoral artery could not be perceived below Poupart's ligament, and neither the popliteal, the anterior tibial, nor the posterior tibial could be felt to beat. An obscure hardness could be made out in the line of the femoral artery in the groin; but, for obvious reasons, it was thought better not to examine this region too minutely. The swollen lower part of the limb was pale and waxy, and extremely cold.

"She stated that on May 28th (four days ago) she was walk-

ing with her sister, when she was suddenly seized with a severe cramping pain down the whole of her left leg and foot. She was compelled to sit down, and could not move. She was taken home in a cab, but was enabled to walk upstairs with assistance. The left leg and foot became swollen and remained very painful, so as to deprive her of sleep. The same parts also felt cold and numbed, and hot flannels were applied to them.

" When brought to the taking-in room on the Wednesday morning, the day of her admission, she became very faint and so helpless that she had to be removed into the clinical ward at once, and was quite powerless. After being in bed a short time she recovered herself.

" The account of the attack, and the character of the symptoms present after her admission, were so suggestive of arterial embolism that the heart was immediately examined. It was then found that at the apex there was a distinct presystolic bruit, not carried towards the left side or the axilla, and terminating in a clear 'first sound.' The heart's dulness was not increased. The impulse was much diffused, but the apex-beat was felt only a little lower than natural.

" The patient was very pale and anæmic, and her expression was wearied and anxious. There was much debility, and she was very languid. On auscultation of the lungs, bronchitic sounds were heard all over the chest, and it was thought that less air entered the right than the left lung posteriorly. No enlargement of the liver or spleen could be detected. The urine was acid, had a sp. gr. 1010, and was albuminous. The right leg and ankle were slightly swollen and œdematous, but not (like the left) cold and painful.

On inquiries being made whether she had ever had rheumatic fever or gout she answered decidedly in the negative. She said that for the last two years she had been in service at a butcher's, and had worked very hard. Before that she had been a charwoman. Up to two years before her admission she had always been stout and healthy. She was then laid up for three months with 'brain fever.' Since then she had not had so good health as formerly, being often attacked with bilious headaches and sickness. During the last winter she had constant cough and expectoration, but no hæmoptysis. For the last six weeks she had been much out of health; the bilious attacks were very

frequent; she was losing strength and flesh, and was not able to do her full amount of work. About three weeks ago her legs pained her, and after much walking about would swell at night-time. She did not, however, give up her situation, until attacked on the Saturday before admission (May 28th) in the way described above."

The diagnosis therefore was that she had contraction of the mitral orifice, probably of non-rheumatic origin; and that her present attack was due to embolism of the femoral artery, where it narrows on giving off the profunda, either by an ante-mortem clot from the left auricle, or a vegetation washed off the mitral valve.

She was ordered to take a grain of opium three times a day; to have a diet of milk, eggs, beef tea, and 4 oz. of sherry; and to have the whole left limb carefully wrapped in blankets and raised on a pillow.

June 2nd.—" She did not sleep well last night on account of the pain in the left limb. The left leg is now of the same temperature as the other one, but the ankle and foot are rather cold and are still swollen." It gives her great pain to touch or move the limb, which has been carefully wrapped in cotton-wool, as well as in the blankets.

3rd.—" Last night she was attacked with most distressing dyspnœa, and became very ill.

> Temp. midnight, 102·5° ... Pulse 120. Resp. 86.
> 4 a.m., 104·2°   „   „

" The pain in her leg and foot is most severe, and entirely deprives her of rest. Over the front of the lungs long, wheezing expiratory sounds are heard; and there appears to be less air entering the right lung than the left, but she is too ill for any minute examination to be made of the chest posteriorly.

" The mouth is now slightly drawn to the right side. She cannot protrude her tongue beyond the lower lip. She is wandering and rambling in her talk, and is restless and irritable. She lies extended on her back, sinking towards the foot of her bed. She is conscious, and recognised her sister and asked for some wine. The skin is perspiring. The tongue is moist and slightly furred.

> Temp. morn. 102·5° ... Pulse 118. Resp. 34.
> Even. 99·8° ...   „ 100.   „ 26.

" The house-physician saw her and prescribed a mixture containing liq. morph. ℳ xxx, vin. ipecac. ℳ xv, sp. æth. nitr. ʒss ex mist. ammon. acet. every six hours; and ice to be sucked.

4th.—" She is much better to-day, and can move and use her arm, but there is still considerable loss of power. She passed a sleepless night. Her leg gives her great pain, and she complains especially of the ankle and foot, having frequent and severe darting pains in the sole. The limb is of the ordinary temperature, and she no longer feels it to be cold. It is extremely tender when touched or moved.

" The urine is acid and of natural quantity; sp. gr. 1015; albuminous.

" The alvine evacuations are rather relaxed; they are passed naturally.

" She has recovered from her wandering and confusion of mind, and her intellect is now perfectly clear. Her tongue, which is moist and furred, catches against the lower lip when she tries to protrude it, and cannot be raised over the obstacle.

Temp. morn. 100° ... Pulse 92, Resp. 24.

5th.—" She only had about three hours' sleep last night, although she took fifteen grains of chloral. She has poultices applied to the chest, and her breathing is relieved.

Temp. morn. 101° ... Pulse 96. Resp. 40.
Even. 100·2° ...   „ 94.   „ 38.

6th.—" She was slightly delirious during the night, and did not get good rest, owing to the pain in her foot and ankle; she had ʒss of chloral.

" There is now no swelling of the left ankle and foot. The temperature of the upper part of the limb, when the thermometer is pushed through the cotton-wool, is found to be 100·6°. The toes are discoloured, and on the outer end of the foot there is a bluish patch, where the skin is evidently becoming gangrenous. Along the outer side of the leg, up to the middle, there is another livid-blue patch, from one to two inches in breadth. The foot is white and waxy in appearance, especially the toes. It feels cold, and its temperature is lower than natural. The whole leg from the knee downwards is now wrapped in lint soaked with carbolic acid and oil (1 part in 20), and this is

again covered with cotton-wool and blankets. There is loss of sensation in the toes; the patient not being able to distinguish which is being touched.

" She is regaining power in her left arm and hand; she can assist herself with it.

" She is now to take ferri et quiniæ citratis gr. v, spir. amm. arom. ʒj ex aq. three times a day; wine ℥vj.

<div align="center">Temp. morn. 101° ... Pulse 118. Resp. 42.</div>

7th.—" She passed a very good night, and is much better this morning; the pain in the left leg is much relieved. Her face is flushed. Her breathing is hurried and difficult, 40 in the minute. There is a frequent cough, but without expectoration. The bowels are open. She takes her nourishment well.

<div align="center">

Temp. morn. 100·9° ... Pulse 104. Resp. 40.

Even. 101·4° ... „ 104. „ 40.

</div>

8th.—

<div align="center">Temp. morn. 100·6° ... Pulse 105. Resp. 36.</div>

9th.—" She has slept fairly during the night. Her leg is less painful, but she complains of darting sensations and of 'pins-and-needles' in it. There is no increase in the size of the gangrenous patches, but the heel on its posterior surface is livid and discoloured. The warmth of the foot has increased, and is nearly equal to that of the healthy parts.

<div align="center">Temp. 100·5°. ... Pulse 102. Resp. 44.</div>

10th.—" She had in the night a severe and most distressing attack of dyspnœa, which lasted two or three hours. Mustard plaisters and poultices were applied to the front of the chest, and gave her great relief.

" She passes her urine and fæces under her. She is restless, watchful, and irritable. The tongue is clean and moist.

<div align="center">Temp. 100·9°. ... Pulse 118. Resp. 51.</div>

" She is to take a mixture containing spir. chloroform. ♏xv ex mist. senegæ ℥j, every four hours; brandy ℥iij.

11th.—" The difficulty of breathing continues at times to be very urgent. She is drowsy, but very restless. She answers questions clearly. She takes her nourishment well, but her medicine makes her retch.

" The chest posteriorly is resonant, and nothing decidedly abnormal is heard on auscultation. She can move the affected limb easily, and prefers to have it drawn up in bed and in a flexed position. She does not suffer much pain from it to-day. Her tongue is dry at the tip and furred. There is constant thirst. The skin is moist. The cough is short and frequent, but without expectoration. The urine and motions are passed into the bed.

<div align="center">Temp. 101·3 ... Pulse 120. Resp. 54.</div>

She was ordered to have mist. spir. vin. gallici ℥j every four hours; and afterwards to take spir. chloroformi ♏xv, infus. digitalis ℥ss, aquæ ℥ss every six hours.

4 P. M.—" The breathing is more laborious, distressing, and difficult. She cannot utter a full sentence. There is much mucous rattling with the breathing, which is chiefly abdominal. Her pulse has become more feeble and her powers of life are sinking fast.

12th.—" This morning she has again lost power in her left arm and hand. Sensation is still perfect. The mouth is drawn to the right side; and her articulation is imperfect and indistinct. She is gradually sinking.

5 P. M.—" She has fallen into an insensible comatose condition, and can take no nourishment.

13th.—" She died quietly at 4 a. m."

The post-mortem examination was made by me, in Dr. Moxon's absence, eleven hours after death.

The body was well-nourished. Just below the knee the left leg looked reddish. There were two distinct gangrenous patches; one on the outer side of the leg, with an irregular zigzagged outline; the other on the inner side of the foot. The toes also looked as if they would have mortified.

The brain was removed, and the cerebral arteries were carefully examined for embolisms; but none could be discovered. The corpora striata appeared to be equally vascular; but the right was perhaps (?) the softer of the two.

Both lateral masses of the cerebellum had undergone a most remarkable change. They were extraordinarily hard, and looked shrivelled, as if they had been soaked in spirit. When incisions were made into their substance, the distinction between the white and the grey matter was hardly noticeable. The central

part of the cerebellum, on the other hand, was in its natural state; and at least one of the corpora dentata presented the usual appearance. The pons, medulla, &c., appeared healthy.

The spinal cord was not examined.

Both lungs were œdematous and rather soft. Near the root of one lung was a good-sized patch of apoplexy (?), which, unfortunately, I omitted to examine more minutely.

The right cavities of the heart had in it only post-mortem coagula, nor did the pulmonary artery contain any emboli.

The left auricle was much hypertrophied; it contained no ante-mortem coagula.

The mitral orifice was contracted, so as scarcely to admit more than one finger. The anterior flap of the valve was greatly thickened, being as thick as a filbert. It had attached to it vegetations, some of which were rather loose.

The left femoral artery was obstructed by a clot, just where the hardness had been felt during life. This at its upper end formed a rounded body, of the shape of a rifle bullet, lying loose in the artery. Below it was a soft, pulpy material, extending some distance lower than the origin of the profunda; and below this again another piece of solid clot. The arterial coats were quite healthy. The clots were unadherent.

The liver was congested; but not in the " nutmeg " state.

The spleen presented a small embolic patch.

One kidney contained a large, irregular, pale embolic patch, with a surrounding red areola.

CASE 6.—*Double presystolic and systolic bruits. No history of rheumatism. Death during third period of admission. Contraction of mitral valve.*

William C—, æt. 20, was in the hospital on three different occasions, on the third of which he died.

The first time he entered Guy's was on July 9, 1867; he then came under the care of Dr. Moxon, in the clinical ward. The following report of his case is based in part upon notes made by Dr. Moxon himself, in part upon those made by his clinical clerk, Mr. S. J. Truman.

Up to two years ago he had been quite well, except that he had had quinsy several times. He had never had rheumatic

fever; nor had any one of his near relations ever suffered from that disease.

His illness began with shortness of breath, and cough; and he "had bad colds." Up to the time stated, he had been able to run and jump as well as any one.

During the winter before his admission he had three attacks of slight hæmoptysis, the expectoration being streaked with blood for a few days. Swelling of the legs had existed for four weeks.

On admission he was suffering from a good deal of dyspnœa, being unable to lie on his side at night. His lips were blue. His respiration was heaving. His legs were swollen in much greater degree than his abdomen, in the lower part of which fluctuation was observed.

The heart was found to be considerably enlarged, the percussion-note being dull for some distance external to the left nipple. The apex-beat, however, appears from the diagram made at the time to occupy the normal position. Over the aortic valves there was a systolic bruit, very faintly carried upwards to the right of the sternum. From the ensiform cartilage to the apex a double bruit was audible, consisting of pre-systolic and systolic sounds; these were loudest somewhat internal to the apex-beat. A rather loud systolic bruit was heard in the axilla, and in the left side of the back, between the scapulæ. Below the ensiform cartilage, in the epigastrium, there was no bruit.

His pulse was very small, but regular; 111 in the minute.

The urine became cloudy with heat and with nitric acid.

On July 10th he was cupped to ʒx. The next day his breathing was easier. Tinct. of digitalis was now prescribed in ♏x doses three times a day. On the 15th he was bled to ʒx from the arm; and he was also ordered to take pil. diuret. c. calomel. j, o. n. The venesection made his breathing much easier, according to his own statements on the following day.

On the 18th it was observed by Dr. Moxon that the position of the greatest intensity of the bruit had changed, and was now two inches below and slightly outside the nipple. Nothing further is said about a presystolic bruit, and a note is made " Right auriculo-ventricular orifice restored ?".

The dropsy gradually subsided; and on September 26th he

left the hospital much relieved. He went to the Convalescent Home at Walton. He was at one time so much better that he could walk eight miles in the day.

About the first week in October, however, his symptoms returned; and he was obliged to apply to the hospital for readmission about six weeks after his discharge. He was placed in Philip Ward under the care of Dr. Pavy.

In the capacity of medical registrar I now examined him, and made the following note at the time: " The main bruit seems to be distinctly systolic; but the heart's action is so rapid that it is not very easy to determine this. The second sound at the base is not very distinct.

" At the apex there is a most marked short presystolic sound, as was noticed when he was in before. So plainly double are the sounds, that one might quite imagine the presystolic sound to be systolic, and the systolic murmur to be diastolic."

At this time there was a constant blueness of the lips; and the face became livid, and the limbs even blue, after the slightest exertion.

He left the hospital a second time, relieved, on March 10th, 1868.

On August 31st, 1868, he was again readmitted into Philip Ward, under Dr. Pavy's care, and died on September 8th. Probably in consequence of the change of ward clerks at this time, no further report of the case appears to have been made.

The post-mortem examination was made by Dr. Dickson, in Dr. Moxon's absence. The heart was found to weigh 26 oz. The pericardium contained much fluid. There was considerable hypertrophy and enormous dilatation of the heart itself; the left auricle alone contained clot enough to fill a half-pint measure.

The mitral valve was indurated, rigid, calcareous, admitting scarcely more than one finger. Its musculi papillares were hypertrophied; their chordæ tendineæ short and thickened.

CASE 7.—*Doubtful presystolic bruit. No history of rheumatic fever. Readmission with typhus. Death. Contraction of mitral valve.* (From the Report of Mr. H. Gould.)

Hannah W—, æt. 21, was admitted into Mary Ward, under Dr. Wilks's care, November 6th, 1867.

She said that she had been in service for six years. Her illness commenced a fortnight ago, when her back commenced to swell, and also her abdomen and legs. She has never had rheumatic fever; but about fifteen months ago she got rheumatic pains in her ankles, wrists, and elbows, which, however, did not confine her to her bed.

" There is a slight thrill with the impulse of the heart during the systole. A presystolic bruit is heard over the region of the mitral valve. The heart sounds are comparatively clear and distinct over the aorta. No sound but the second is heard in the back just below the spine of the scapula. The bruit is very circumscribed, heard best just below and to the left of the left nipple. The pulse in the neck is visibly dicrotic; the pulse at the wrist is 96, small, and faintly dicrotic."

On the 11th I examined the breast, and " could make the murmur nothing but systolic. I should rather have called it a prolonged first sound." '

Dr. Moxon, however, examined the patient about the same period, and came to the conclusion that the murmur was presystolic.

On November 14th the medical ward clerk made a note that " the bruit with the systole seems to diminish in intensity, and can hardly be called a bruit now, but rather a prolonged first sound."

She left the hospital on November 16th, but on December 17th she was readmitted with fever, of which she died, on December 30th.

On post-mortem examination it was found that the heart weighed 10 ounces. The left auricle was the only cavity that was hypertrophied. The appendix was long and thick. The mitral valve just admitted the tips of two fingers. It presented no vegetations, nor was it roughened.

II. *Cases in which the mitral valve, or orifice, was found after death to be narrowed, but in which no presystolic bruit had been heard during life.*

These cases amount to forty in number. I shall refer to them very briefly, mentioning only the details necessary for their identification in addition to such points in the post-mortem appearances as may appear particularly interesting.

CASE 8.—Pamela D—, a patient of Dr. Rees's, in Clinical Ward, died November 9th, 1866. She had had rheumatic fever at the age of sixteen, and six or seven times since. The pulse was very irregular, and so small that it was impossible to count it. There was a systolic murmur (?). On a previous occasion she had been in Esther Ward, and Mr. Goodhart reported that there was a " mitral " murmur. The pulse was then very irregular.

On post-mortem examination, Dr. Moxon found the mitral valve so narrow that one finger-point barely passed. It had on it numerous petrified vegetations. The chordæ tendineæ had coalesced. The left auricle contained ante-mortem clots. All the cavities had hypertrophied walls, except the left ventricle.

CASE 9.—Harriet D—, æt. 30, a patient of Dr. Pavy's, in Lydia Ward. On admission the pulse was very irregular, and could scarcely be counted. A distinct systolic murmur was heard before her death, which occurred on November 13th, 1866. She had had rheumatic fever when ten years old.

At the post-mortem examination, Dr. Moxon found that the mitral valve was so contracted that the point of one finger could not be passed through it. The right side of the heart was hypertrophied. The left auricle was greatly hypertrophied. The left ventricle was very small.

CASE 10.—Julia S—, æt. 42, a patient of Dr. Rees's, in Lydia Ward. The reporter of her case states that she had suffered for several years from pain over the heart, and shortness of breath. It is not said whether she had had rheumatism. On admission there was a systolic murmur. A week later I examined her, and noted that I could detect no murmur. Before her death, which took place on March 10th, 1867, a very loud systolic murmur was heard. The impulse of the heart was then very strong.

Dr. Moxon found that the pericardium was universally adherent. All the cavities, except the left ventricle, were much dilated and hypertrophied. The mitral orifice had the form of a " button-hole:" it was so contracted that one finger would not pass. The chordæ, especially the left set, were much shortened, so that the musculi papillares touched the substance of the valve,

which itself was thickened. It presented traces of recent vegetations. The aortic valves were natural.

CASE 11.—A. M. W—, æt. 68, a patient of Dr. Wilks's, in Mary Ward. She had never had any rheumatic attack. Four months before her admission she had had an attack of right hemiplegia, with indistinct speech. From this she in part recovered. The pulse was very irregular, 110. There was a loud systolic bruit heard at the apex, but loudest over the third costal cartilage. Under ℳ x doses of tincture of digitalis the pulse fell to 84, but was still fluttering and feeble. It was afterwards thought that a tricuspid bruit was discovered. She died on April 4th.

Dr. Moxon found that the heart weighed fourteen ounces. There was pretty uniform hypertrophy of the walls of all the cavities. The wall of the left ventricle was decidedly fatty. The dilatation was considerable, affecting especially the left auricle. This cavity contained three large ante-mortem clots, held only by the mouth of the dilated appendix in which they lay. In its extremity was another decolorised clot. The mitral valve would admit only one finger. The chordæ had coalesced and were obsolete, so that the valve received the musculi papillares direct. The flaps were $\frac{3}{20}$ths inch thick at the margin, and contained a strong plate. The aortic valves were thick and dilated.

CASE 12.—Eleanor W—, æt. 44, a patient of Dr. Pavy's, in Clinical Ward. On her admission she was almost in a state of collapse, and the heart-sounds were feeble, so that no bruit was detected. She died at 4 a.m. next morning (May 2nd, 1867). She had had rheumatism twenty-three years before.

Dr. Moxon found that there was extensive effusion into both pleural cavities. The heart weighed fourteen ounces. There was equal hypertrophy and dilatation of all the cavities. The left auricular appendix contained laminated ante-mortem clot. The mitral valve would barely allow one finger to pass. Its edge was thick, and rigid with points of calcification. From the anterior face came down a long bony column, tapering downwards, in continuity with one of the " chordæ of the first order." The aortic valves were very thick, and adherent at their sides.

CASE 13.—Sophia T—, æt. 44, a patient of Dr. Hicks's, in Mary Ward. Premature labour was brought on in consequence of the distress caused by a cardiac murmur, accompanied with albuminuria. No clinical notes of the case appear to have been taken. She died on May 3rd, 1867.

Dr. Moxon reports that the heart weighed fourteen ounces. There was hypertrophy of the right side; little, if any, dilatation. The right auricle was thickened and crisp, with a rounded appendix. The right ventricle had a very thick wall near its base, and looked just like a left ventricle. The pulmonary valves were coarse, with large corpora arantii. The pulmonary artery had the usual appearance of the aorta, presenting much fatty degeneration. The left auricle was thick-walled, but not much dilated. The mitral orifice would scarcely admit the tip of one's finger, and was kept open by a rigid mass in the left side of the valve. On section the valve was one third of an inch thick, and contained gritty matter. There was scarcely a trace of any vegetations. The aorta was very small, and free from degeneration, thus contrasting markedly with the pulmonary artery.

CASE 14.—Susan S—, æt. 46, a patient of Dr. Habershon's, in Esther Ward. She died six days after her admission; and no report of the case can now be found.

Dr. Moxon reports that the mitral orifice was so contracted as to scarcely allow one finger to pass. The left auricle was much hypertrophied. Its appendix contained large masses of firm laminated clot. The right cavities were also enlarged, and the pulmonary artery was thickened. The left ventricle was small.

CASE 15.—Maria C—, æt. 29, a patient of Dr. Habershon's, in Esther Ward. The report of her case has been lost; but the entry in my Registrar's book is "dropsy, tricuspid bruit." Probably, therefore, no presystolic murmur was heard.

Dr. Pye-Smith made the post-mortem examination on August 7th, 1867. The heart was greatly hypertrophied. All its cavities were dilated. The right appendix was opened out. The right auricle contained a pound of clot, mostly red, but some of it decolorised. The left auricle was dilated, the

mitral in a " button-hole " state, not admitting two fingers. Its curtains and chordæ were very thick.

Case 16.—Elizabeth B—, a patient of Mr. Cooper Forster's, in Dorcas Ward, died on August 11th, 1867, of peritonitis, after an operation for strangulated hernia. The mitral valve would admit only one finger.

Case 17.—Amy S—, æt. 44, a patient of Dr. Rees's, in Lydia Ward. She had never had rheumatic fever. She had great dyspnœa. The pulse was very irregular. The ward clerk, Mr. F. Robertson, reports that the heart-sounds were " normal, so far as he could ascertain." She died on August 30th, 1867.

The left auricle was much dilated, and its appendix was expanded, containing a " polypus." The mitral orifice would just admit the tip of the little finger, and the graduated cone up to an inch and three quarters. The curtains were very thick and opaque; the chordæ were thick and short.

Case 18.—Emanuel H—, æt. 50, a patient of Mr. Poland's, in Job Ward, suffering from gangrene of the foot. He also had hemiplegia. No mention of the state of the heart sounds during life is made in the notes accompanying the post-mortem report. He died on November 9th, 1867.

Dr. Moxon found that the left ventricle was of natural size; the left auricle much thickened and dilated. The mitral valve also was greatly thicker than natural. Its left chordæ were united by a rounded carunculated soft mass of matter, with little loose lobules, exactly corresponding in character with that of the two clots (no doubt embola) which were found in the left anterior and middle cerebral arteries respectively. The auricular face of the valve also had a compact mass attached to it, much obstructing the passage.

Case 19.—W. G—, æt. 45, a patient of Mr. Hilton's, in Cornelius Ward, on account of a fracture of the pelvis, with laceration of the urethra. He gradually sank, and died a month after admission, on November 13th, 1867.

Mr. Eastes made the post-mortem examination, and reports that the mitral valve was very narrow, admitting only one finger

through it. This condition, he adds, was probably congenital, for the margin was smooth, and the valve itself thin and apparently healthy. The left auricle was of natural size ; its valves were very thin. The development of the left ventricle was normal.

CASE 20.—Thomas S—, æt. 23, a patient of Dr. Habershon's, in John Ward. He had had rheumatic fever two years before. On admission the pulse was almost imperceptible, but was counted at 134. The sounds were irregular and loud, so as to render the diagnosis uncertain ; but a systolic murmur was heard at the apex and more distinctly towards the sternum. He died the day after his admission, December 12th, 1867.

On post-mortem examination the aortic valves were immensely diseased; and the left ventricle enormously dilated. The mitral valve would admit only two fingers.

CASE 21.—Samuel B—, æt. 29, a patient of Dr. Moxon's, in Philip Ward. He was moribund on admission, January 20th, 1868. His pulse was 140. The heart-sounds could not be distinctly heard, but no bruit was discovered by Mr. Rigby-Hughes and Mr. Goodhart, medical ward clerks at the time. He died the same night.

Dr. Moxon found the heart to weigh twenty-six ounces. There was great and equal hypertrophy and dilatation of all the cavities. The right ventricle was very thick and hard. The mitral valve was very thick, and so narrow that only the tip of one finger would pass. The united parts of the flaps were calcareous, and formed large round stony masses, one at each side of the orifice. There were apoplexies in the lower lobe of the left lung chiefly.

CASE 22.—Mary C—, æt. 26, a patient of Dr. Rees's, in Lydia Ward. She had had rheumatic fever fourteen years before. The report is very imperfect, containing no account of the physical signs. The pulse was 120. She died on March 12th, 1868, eight days after admission.

Dr. Moxon found that the heart weighed twelve ounces. The right cavities were dilated, and their walls hypertrophied. The pulmonary artery was moderately thickened. The left auricle

was much dilated; its walls were thick, hard, and fleshy; its lining membrane whiter than natural. The appendix was opened out. The edge of the mitral orifice was very rigid, and partly calcareous. It was slit-shaped, and a finger could not enter the ventricle from the auricle. When water was thrown into the aorta, it flowed very freely through the mitral aperture.

CASE 23.—M. A. C—, æt. 19, a domestic servant, under the care of Dr. Habershon, in Lydia Ward. She had never had rheumatic fever. About five weeks ago a fire occurred at her master's house; she was very much frightened, and caught cold. From that time she became unable to rest at night, from a sense of suffocation; and she had great dyspnœa when going up stairs. Subsequently her legs began to swell. A systolic bruit was heard at the heart's apex and in the axilla, but not posteriorly. She died on March 27th, 1868, a month after her admission.

Dr. Moxon reports that the heart weighed twelve ounces. There was much dilatation and hypertrophy of the right side, the right auricle being especially large. The left auricle was greatly hypertrophied. The pericardium contained fifteen ounces of yellowish, nearly clear fluid; it was minutely injected, and contained a little patch of tough lymph about the great vessels. The mitral valve was slit-shaped, and so much narrowed that (according to the diagram made at the time) it would not have admitted a threepenny piece edgewise. The tricuspid valve also was markedly diseased; its chordæ were united into columns exactly as were those of the mitral. The left ventricle was small. The right auricle was lined with an opaque white membrane. Its appendix was opened out almost into continuity with its cavity, which would hold nine or ten ounces. The pulmonary artery was dilated, measuring four inches in circumference before its bifurcation; whereas the thoracic aorta measured under two inches. The pulmonary artery also had several opaque patches at its points of division.

CASE 24.—William J—, æt. 42, a patient of mine, in the Clinical Ward. He was suffering from a cerebral attack, and died the day after his admission, June 19, 1868.

The post-mortem examination was made by Dr. Moxon, who reports that the heart weighed fourteen and a half ounces. There was remarkable hypertrophy of the left auricle. The right side also was hypertrophied. The left auricle was not larger than natural. No ante-mortem clots existed in any of the cavities.

The mitral valve was so thickened and contracted that the finger could scarcely pass. The chordæ were thick; no one of them was thinner than a probe. They were also very short, and the mitral valve was reduced very much to the condition of a narrow funnel. The aorta was disproportionately small; the pulmonary artery very thick, and slightly atheromatous.

The right Sylvian artery contained a firm rounded clot. There were wedge-shaped patches in the kidneys.

CASE 25.—Fred. T—, æt. 10, a patient of Dr. Habershon's, in Stephen Ward. The clinical report has unfortunately been mislaid, but it is stated that he had had rheumatic fever six months before, and that he had a " mitral bruit."

Dr. Moxon reports that the right side of the heart was remarkably hypertrophied; as was also the left auricle. There were small ante-mortem clots in both auricles. The tricuspid valve was thicker than natural, and it was fringed with bead-like granulations. The pulmonary artery was nearly twice as thick as the aorta. The aortic valves were thick and puckered, and had evidently not been competent, yet the left ventricle was not enlarged nor thickened. The mitral valve was narrowed by contraction and thickening, and by adhesion of its segments, so that the little finger could not be got into it. It would scarcely have admitted a shirt-button. The walls of the left auricle were lined with a very opaque membrane.

CASE 26.—John B—, æt. 31, a patient of Dr. Pavy's, in Clinical Ward. No report of the case was taken, as he died immediately after his admission into the hospital, August 17th, 1868.

Dr. Moxon reports that the heart was moderately but uniformly enlarged. The mitral valve was contracted, so that two finger-points would not enter. Its edge was uneven from granulations; and on the septal side was a hard mass of calcareous vegetations. One of its chordæ was ulcerated through, hanging

loose, and covered with vegetations. The aortic valves were thick, and each flap had a firm vegetation on it, so that the valves probably were not competent.

Case 27.—James S—, æt. 14, died of pyæmia, with acute necrosis of the tibia, after an injury. He had had rheumatic fever two years previously. His legs had swelled six months before his admission. His pulse was 104. No bruit is mentioned in the notes appended to the post-mortem report.

The heart weighed eight and a half ounces. The mitral valve was " rather narrowed, not admitting two fingers."

Case 28.—Eliza P—, æt. 39, a patient of Dr. Wilks's, in Mary Ward. She died on August 29th, 1868, three days after admission. No report of her case had been taken.

The heart weighed thirteen ounces. The mitral valve was indurated and contracted, admitting only the tips of two fingers.

Case 29.—William P—, æt. 47, a patient of Dr. Habershon's, in Stephen Ward, admitted for " aortic and mitral disease with dropsy." He had had acute rheumatism twenty-five years before. A systolic bruit was heard at the apex, and a diastolic bruit at the base. Pulse at first 102, afterwards 72, very irregular. He died on September 18th, 1868.

On post-mortem examination the pericardium was found to be universally adherent. The aortic valves were diseased. The mitral valve just admitted the tips of three fingers. Its margin was thickened, atheromatous, and ulcerated.

Case 30. — Alice C—, a patient of Dr. Wilks's, in Mary Ward, suffering from acute pneumonia, of which disease she died on September 21st, 1868, a fortnight after her admission. Her pulse was of course very rapid. There is no reference to the sounds of the heart in the ward clerk's report.

On post-mortem examination it was found that the mitral valve would only just admit the tips of three fingers.

Case 31.—Mary W—, æt. 40, a patient of Dr. Rees's, in Lydia Ward. She had had rheumatic fever five times, the first attack

having been when she was eighteen years old. On admission, January 4th, 1869, her hands and feet were cold, and no pulse could be 'felt at the wrists. The action of the heart was very rapid and irregular. No bruit could be detected. She died at 8.30 p.m. on the following day.

Dr. Moxon found that there was universal adhesion of the pericardium. All the cavities, including the left ventricle, were dilated and hypertrophied. The left auricle was very large, but thin-walled ; its septum presented an aneurismal yielding of the size of a pigeon's egg, which could be pushed into either auricle. The appendix contained ante-mortem clots. The mitral orifice was narrowed, admitting two finger-points with difficulty. The valve had no, vegetations, ánd was not ulcerated The aortic valves were healthy.

CASE 32.—Mary W—, æt. 40, a patient of Dr. Habershon's, in Esther Ward. She had had " rheumatic pains " in her joints the winter before, but had not been laid up. She had suffered from dyspnœa for about four months. On admission, her case was regarded as one of mixed disease. Her report is headed, "*Albuminuria. Systolic apex murmur. Bronchitis. Enlarged liver. Dropsy, &c.*" On one occasion when I examined her, I could hear no bruit. Ten days later also thé ward clerk reports that it was inaudible. The next day, he adds, " it seems to come and go, and sometimes there is no bruit, and yet half an hour later a loud blowing noise may be heard." She died on March 18th, five weeks after her admission.

Dr. Moxon reports that the left ventricle was very small, and thin-walled. The left auricle was very large. The appendix was two and three quarters of an inch long, and sigmoidal in form. Its muscular substance was one quarter inch thick in some parts, and one eighth in other parts. The mitral valve admitted the tip of one little finger only; it had on it some vegetations. There was embolism of the kidneys.

CASE 33.—John McD—, æt. 24, a patient of Dr. Rees's, in Philip Ward. As Medical Registrar, I headed the report of his case, " Albuminuria. Bronchitis. Systolic bruit (? Tricuspid "). The question of his having independent valvular disease was so little taken into consideration that the report says nothing about

his having, or not having, had rheumatism.   He died on March 29th, 1869.

The heart weighed 21 ounces.   The left ventricle was small. The mitral valve was so contracted as to be no larger than a shirt button hole.   The enlargement of the right side and of the left auricle, accompanying this condition of the valves, was well shown.   The kidneys were coarse and congested, but appeared to be otherwise healthy.

CASE 34.—Stephen K—, a patient of Mr. Birkett's, in Lazarus (surgical) Ward.   There is no report of the heart-sounds; but it was stated that he had had rheumatic fever.

The post-mortem examination was made on April 9th, 1869. The pericardium was adherent, containing patches of stony substance.   The mitral valve was very thick and contracted; its chordæ were immensely thickened.

CASE 35.—Ann F—, æt. 52, a patient of Mr. Cock's, in Dorcas (surgical) Ward.   Chloroform was given to her, with the object of facilitating the reduction of a femoral hernia.   Syncope came on within a minute from the time of the commencement of its administration.

The post-mortem examination was made on April 24th, 1869. The pericardium was inseparably adherent.   The mitral orifice was thickened and puckered, admitting barely two fingers.

CASE 36.—Robert S—, æt. 59, a patient of Dr. Rees's, in Philip Ward.   His symptoms on admission were chiefly cerebral.   But a harsh murmur is reported as having been present.

Dr. Moxon reports that the heart weighed sixteen ounces. There was hypertrophy of the left auricle and of the right side. The left auricle contained many fine " polypi."   The mitral valve admitted one finger easily, as far as the first joint.   The edges were thickened; and the left border contained a calcareous mass.

CASE 37.—Hannah S—, æt. 53, a patient of Dr. Wilks's, in Mary Ward.   She had had fever, with pains in the limbs and joints, two months before.   She was still feverish, and had

pleurisy on admission. No bruit was audible; the pulse ranged from 125 to 150. She died at the end of a fortnight, on July 21st, 1869.

The pericardium was adherent. The mitral valve was moderately narrowed; its edge covered with close-set granular vegetations.

CASE 38.—Frederick T—, æt. 27, a patient of Dr. Habershon's, in Philip Ward. He died two days after his admission, on August 4th, 1869. No regular report of his case appears to have been taken; but in Dr. Moxon's notes, appended to the report of the post-mortem examination, it is stated that he had had rheumatic fever, and that there was a systolic bruit at the heart's apex. The heart's impulse was heaving. He had dropsy, &c.

The pericardium was closely adherent by delicate areolar tissue. The hypertrophy and dilatation were pretty equally distributed over all the cavities, except that the left auricle was disproportionately large. The mitral orifice was of the size of a greatcoat button-hole, but rather wider. It had no recent vegetations. Its free edge was one fifth of an inch thick, and calcareous. The chordæ of the left bundle were consolidated into a thick column. Those of the right bundle were separate, but thicker than natural.

CASE 39.—Mary E—, æt. 45, a patient of Dr. Rees's, in Lydia Ward. She had had rheumatic fever nineteen years previously, and another attack thirteen years later. The report of her case is headed " *Morbus Cordis. Dropsy.*" No bruit was audible. The pulse at the wrist was counted at 132, and was excessively small and unequal. She died at the end of a fortnight. Three days after her death it is noted that the heart's beats, although very rapid, and of a jerking character, were more distinctly heard than on admission.

On post-mortem examination it was found that the mitral valve was contracted, so that one finger would not enter. The edges of its orifice could be closed, but not easily; they were stiffened by infiltration with lime salts. The appendix of the left auricle, which was greatly enlarged, contained ante-mortem clots. All the cavities, except the left ventricle, were dilated and hypertrophied. The pericardial sac contained an ounce and

a half of effusion, with shreds of lymph. The lungs contained apoplectic patches.

CASE 40.—Elizabeth H—, a patient of Dr. Phillips's, in Mary Ward. There is no report of the case, beyond the fact that the legs were swollen to a moderate extent, and that she had been recently delivered.

Dr. Moxon found (November 16th, 1869) that the right side of the heart and the left auricle were much enlarged; the left appendix especially being very large. The left ventricle was very small. The mitral valve was so contracted that one finger-point would not pass through it. Its right chordæ were much thickened, but not united together; its left chordæ a little thickened. There were four large apoplectic patches in the right lung.

CASE 41.—William S—, æt. 52, was admitted into Job (surgical) Ward, under the care of Mr. Poland, on account of a cut throat. The wound, however, was not sufficient of itself to cause death; and the principal symptoms were rather those of morbus cordis and bronchitis. He had had rheumatic fever. No notes appear to have been taken of the physical signs observed during life.

On post-mortem examination (December 22nd, 1869) it was found that there was hypertrophy with dilatation of the right cavities and left auricle. The pericardium was ecchymosed and acutely inflamed. The mitral valve was contracted, so that one finger would not pass through it, yet the surfaces fitted together well. The left ventricle was small.

CASE 42.—James S—, æt. 33, a patient of Dr. Moxon's in Philip Ward. He had never had either rheumatic fever or scarlet fever. The heart's action was very quick and irregular; the pulse very small. A loud bruit was heard with the first sound at the heart's base and in the epigastrium (tricuspid). There was much anasarca. He died a fortnight after his admission, January 11th, 1870.

On post-mortem examination the heart was found to weigh seventeen ounces. There was great hypertrophy with dilatation of the right cavities. The left auricle was enormously thickened:

its fleshy wall in one part was a quarter of an inch across. The left ventricle was diminished in size. The mitral orifice was so narrowed that only one finger-tip would pass. Its right angle was held permanently open to one sixth of an inch by calcification. The chordæ were rather thick, but were not united together. The tricuspid valve was thickened at its edge, and turned into the ventricle. It had on it slight vegetations. The wall of the pulmonary artery was half as thick again as natural.

CASE 43.—Amelia D—, æt. 48, a patient of Dr. Habershon's, in Clinical Ward, suffering from chronic bronchitis and emphysema. She had never had rheumatism. No bruit was heard. The impulse of the heart was strong, out of all proportion to the pulse, which was very weak and intermittent, ninety-six per minute. She died about five weeks after her admission.

On post-mortem examination the mitral valve was found to be much contracted, admitting only the tip of one finger.

CASE 44.—M. A. F—, æt. 45, a patient of Dr. Habershon's, in Mary Ward, with albuminuria and dropsy. The heart-sounds were normal. At the post-mortem examination, on May 6, 1870, the kidneys were found to be wasted. There was acute pneumonia and pericarditis. The left ventricle and auricle were both hypertrophied, especially the ventricle. The mitral valve was narrower than natural, admitting only two fingers; however, it presented no sign of disease.

CASE 45.—M. A. B—, æt. 22, a patient of Dr. Wilks's, in Mary Ward. A systolic mitral bruit was audible in the axilla, and was extraordinarily loud in the back. There was also believed to be a tricuspid bruit. The pulse varied from 132 to 112. She seems never to have had rheumatism. She died three weeks after her admission, April 26th, 1870.

On post-mortem examination it was found that the heart weighed twelve and a half ounces. The left auricle was twice as thick as usual. The mitral valve would only admit the thumb. Its edge was thick. On the chordæ was a mass of vegetation three quarters of an inch long. The lungs contained apoplectic patches.

CASE 46.—George E—, æt. 68, died, under Mr. Poland's care,

in Job (surgical) Ward, of emphysema, consecutive to fracture of the ribs. It was found after death that the mitral orifice would only admit two fingers.

CASE 47.—George C—, æt. 42, a patient of Mr. Birkett's, in Lazarus (surgical) Ward, suffering from stricture. I was asked to examine him some time before death, on account of his having some pulmonary symptoms. But I did not specially notice the heart-sounds.

At the post-mortem examination (which was made by Dr. Dickson in Dr. Moxon's absence) it was found that the mitral valve was like a button-hole in form, admitting only one finger. It was rigidly patent from calcareous deposit. The left auricle was dilated and hypertrophied; its walls stood out, as if made of some stiff material. The left ventricle is also said to have been a little hypertrophied; but the heart as a whole was hardly increased in size.

III. *Cases in which a presystolic murmur was recognised on auscultation, but in which no opportunity was afforded of veri-fication by post-mortem examination.*

These cases are nineteen in number. Like those which came under the first heading, they may be divided into two groups; the first including cases in which there was a single murmur, the second those in which a double murmur was heard, comprising a systolic as well as a presystolic element.

Into the first group fall nine cases.

CASE 48. (From the report of Mr. C. W. Chapman.)—Ann McG—, æt. 17, admitted into Mary Ward, under my care, February 27th, 1867. She had had rheumatic fever when four and a half years old; scarlatina at the age of eight years. She was a delicate-looking girl, with lateral curvature of the spine. She complained of pain in the back, palpitation, &c.

The dulness on percussion over the heart was much more extensive than natural, reaching down to the sixth rib. The impulse was slightly diffused. The apex beat was situated between the fifth and sixth ribs, immediately below the nipple.

A distinct presystolic bruit was audible at the apex of the

heart, beginning instantly after the "second sound," and running right up to the next " first sound." The only pause was thus that between the first sound and the second. The first sound was peculiarly sharp. The bruit was rather harsh in quality. It was loudest somewhat to the left of the nipple. About an inch to the right of the nipple it rather suddenly became inaudible, and the two natural sounds were heard in that region. The murmur did not extend round to the back.

A tonic treatment was adopted.

While in the hospital she had an attack of subacute rheumatism, during which, however, the pulse was noted at fifty-six in the minute. She was discharged, relieved, on May 10th.

CASE 49. (From the report of Mr. C. J. Oldham.)—M. A. F—, æt. 30, was admitted into Lydia Ward, under the care of Dr. Rees, February 20th, 1868. She complained of violent palpitation of the heart, coming on at intervals without warning, attended with much pain in the cardiac region, and with sensations of choking and of suffocation. She had been liable to such attacks for three months. About four months ago she "hurt herself" while moving a heavy piano, and felt a sudden pain in the side. She said she had never been very strong, but had never had either rheumatism or chorea.

Her face was much flushed. Pulse 90. The apex beat of the heart was situated immediately under the nipple. The sounds at the base were normal. At the apex a churning presystolic bruit was heard, unattended with thrill perceptible by the fingers. The bruit was not audible in the back.

The treatment consisted chiefly in the administration of tinct. hyoscyam. She was discharged on March 16th, relieved, but with the physical signs unaltered.

CASE 50. (From the report of Mr. Grigson.)—John D—, æt. 17, admitted under the care of Dr. Rees, August 19th, 1868. He was a scrofulous-looking, badly-nourished lad. He had never been healthy, having had typhoid fever severely, and scarlatina two years before his admission. He had pains in his knees and elbows three weeks ago.

Pulse 88. Apex-beat between sixth and seventh ribs, in the mammary line. Churning murmur at the apex, certainly not systolic in rhythm, not carried round towards the back.

Four days after his admission he went down to the chapel, and never returned to the ward.

CASE 51. (From the report of Mr. A. W. Smith.)—Jane R—, æt. 18, admitted into Esther Ward, under the care of Dr. Habershon, September 23rd, 1868. She was a chlorotic girl, suffering from coldness of the feet, amenorrhœa, palpitation, &c.

The apex-beat of the heart lays immediately below the nipple, between the fifth and sixth ribs. The second sound at the base to the left of the sternum was very loud. At the apex there was a loud bruit, of a "churning" character, presystolic (?) in rhythm. It was not audible in the back.

She had never had rheumatic fever, but had had occasional pains in her joints.

Under a tonic plan of treatment the chlorosis was cured, and she was discharged on November 3rd.

CASE 52. (From the report of Mr. Alan R. Manby.)— Elizabeth H—, æt. 29, admitted into Lydia Ward, under the care of Dr. Rees, January 19th, 1869.

She was a delicate-looking woman, and had had acute rheumatism two years before. For three months she had been suffering from aching pain in the left side, and frequent palpitation.

As she had scabies when admitted, her chest was not minutely examined; but on February 1st the ward clerk remarked that there is a presystolic (?) bruit at the apex ; and on the 15th I examined her and noted that there was " a characteristic churning presystolic sound. The first sound at the apex was sharp and clear. Pulse 75."

She left the hospital on March 11th, on account of a suspicion that she was pregnant.

CASE 53. (From the report of Mr. Charles Henry Watts Parkinson.) — Charles M—, æt. 10, admitted into Stephen Ward, under my care, March 3rd, 1869. He had had rheumatic fever about a year previously, and since then had been " short-winded," being often obliged to stop to get his breath. He had also suffered much from palpitation. He had been an out-patient under my care for some time before his admission.

He was a thin, pale child, with clear, transparent skin, large pupils, and long eyelashes.

At the apex of the heart a well-marked "churning" presystolic bruit was audible, abruptly terminated by the first sound. The bruit was prolonged towards the axilla, but (in the words of the ward clerk) " was rapidly lost towards the base."

On March 4th he was ordered tinct. digitalis ℥v, tinct. ferri ℥x, three times a day.

The pulse, at first 100, fell to 80—84.

On the 29th I made the following note :—" When he is quiet the bruit is very slight and local, being heard just below and internal to the nipple, at the exact seat of the apex-beat. I made him walk briskly twice up and down the division of the ward. Thereupon the heart's action grew very tumultuous and quick, and the bruit became developed in a most striking manner, and was loud and of a very ' churning' quality."

He went out, relieved, on April 2nd.

CASE 54.—Eliza B—, æt. 31, was admitted into Clinical Ward, Guy's Hospital, under my care, August 7th, 1869. She had been a patient of Mr. Muriel's, of Hadleigh, in Suffolk, who sent her up to the hospital in April, 1868, when she attended at first among my outpatients for some time. A most marked presystolic murmur was diagnosed on the first occasion of her attending at Guy's, and in April, 1868, she was admitted into Mary Ward, and remained there for some time, when her case was made the subject of careful study. Unfortunately the notes taken at that time have been lost. The following notes were taken by Mr. W. J. P. Douglas, clinical clerk :

" She has to work hard as a governess in a school, but she has never been a strong woman; she has not, however, at any time had either rheumatic fever, chorea, or any rheumatic affection of the joints. When two years old she fractured her right patella, and subsequently her knee-joint become contracted, so that she had to undergo the operation of tenotomy in King's College Hospital. The commencement of her present illness she dates from five years ago, when she first experienced shortness of breath and pain in the left side.

" *Condition on admission.*—She is well nourished, of a dark

complexion, and rather anæmic. The chest is rather ill-shaped, the right costal cartilages being unduly prominent.

" The apex of the heart beats between the fifth and sixth ribs. There is a marked presystolic bruit, loudest at the heart's apex, but heard more or less all over the cardiac region. It is also heard posteriorly, but very faint. A thrill accompanies the murmur. Pulse 80.

" The breathing sounds are natural.

" August 7th.—She is to take mist. ferri co. ℥j three times a day.

" 14th.—She has been improving in health since her admission. She generally sleeps well, but is sometimes awakened by a sharp, piercing pain in the region of the heart. Walking even a short distance causes great breathlessness. The character of the bruit has altered. There is now a distinct interval between the bruit and the first sound, which is itself sharp. Towards the base the second sound is double, and seems to be immediately followed by the bruit.

" 18th.—The presystolic character of the bruit is again well marked to-day. Pulse 72, but much accelerated by exertion.

" 19th.—Her appetite is still very bad, and she is unable to get about without great fatigue. The conjunctivæ are tinged with a slight yellow colour. Pulse 72 when she is quiet, but much more rapid after the least exertion. To take mist. quiniæ ℥j three times a day.

" 24th.—She complained of aching of the teeth after walking about yesterday. She says she is subject to this, and especially if she attempts to walk uphill.

" September 1st.—She complains of considerable pain in the lower part of the left chest anteriorly, which at times is like cramp. Linim. belladonnæ to be applied to the seat of pain.

" 3rd.—The pulses at the wrist are alternately weak and strong, as also are the sounds of the heart. She has not so much pain in the chest."

On September 6th she left the hospital.

She was readmitted in the autumn of 1870, when her symptoms and physical signs were very similar to those recorded on previous occasions; but some special points were observed, which will be recorded further on in this paper.

CASE 55. (Case reported by Mr. G. E. Knight Thorpe.)—Margaret McG—, æt. 46, admitted under the care of Dr. Habershon, into Lydia Ward, June 2nd, 1869.

She was a nervous, anxious woman, with a care-worn expression. She had slight jaundice and some ascites, and complained of great pain in the thighs.

When she was admitted there was a well-marked "churning" presystolic bruit in the usual position. She had been in India, and probably had not been very temperate. In 1857, while in Europe, she had suffered from rheumatism, but she had never had rheumatic fever.

On June 26th I made the following note : " Examination of the heart now yields nearly a negative result, even after she has been walking slowly up and down the ward. However, she says that any excitement makes the heart tumble about."

On June 29th she went out, "greatly relieved." However, on September 14th she applied for readmission. Her liver was now found to be distinctly enlarged, and the symptoms from which she suffered appeared to be mainly referable to that organ. On September 23rd I made the following note : Internal to the left nipple, and on a level with it, the first sound seems to be preceded by a churning noise. The apex-beat is not displaced outwards. The veins of neck are distended and pulsate, especially on the right side and during the act of expiration. Pulse 108.

The ascites and anasarca increased, and paracentesis abdominis had to be performed. However, she sank, and died on December 4th. A post-mortem examination was not made.

CASE 56. (From the report of Mr. Richard Galpin.)—M. A. W—, æt. 32, admitted into Mary Ward, under my care, February 16th, 1870. She is a widow, and enjoyed good health until twelve months ago, when she was suddenly seized, while stooping, with a pain in the heart. She became pallid and faint, and breathless, and experienced a sensation as if her heart had stopped, with a sense of impending death. She was placed in a chair, and, although she did not lose consciousness, the paroxysm lasted twenty-five minutes.

" Similar attacks have recurred at intervals ever since, sometimes three or four times a day. Their duration is from ten

minutes to half an hour. When they come on the patient is obliged instantly to desist from whatever she is doing, and either to stand still or to sit down. She obtains relief sooner by lying on her back than in any other way.

" She is a badly nourished, very delicate-looking woman.

" A marked presystolic murmur is heard on auscultation of the heart, running up to the first sound. The heart's action is regular, and not tumultuous. The pulse is very small.

" She is unable to lie down for any length of time, owing to a sense of suffocation. Her ankles are at times puffy.

" She has never had rheumatism nor scarlatina.

" February 22nd.—Pulse 76; respiration 22; temperature 98°.

" 23rd. — Pulse 60; respiration 22; temperature 97·8°. To take tinct. senegæ ʒj, decoct. senegæ ʒss three times a day."

" March 2nd.—Pulse 84."

The paroxysms recurred occasionally while she was taking the senega; and although she is stated in the report towards the end of the month "to be much better," it is not stated in what respect her condition was ameliorated.

She left the hospital on March 30th.

Into the second group, in which a double murmur (presystolic and systolic) was heard, there fall ten cases.

CASE 57. (From the report of Mr. E. E. Cass.)—Amelia A—, æt. 13, admitted into Lydia Ward, under the care of Dr. Rees, April 20th, 1869.

" She is an emaciated, strumous-looking child; she had rheumatic fever five years ago, and was ill five weeks. Ever since then she has suffered from shortness of breath. Her father has had gout and rheumatism.

On her admission one metacarpo-phalangeal joint was a little painful and swollen. The cardiac dulness commenced at the third rib; and the apex was felt beating very forcibly against the sixth rib, vertically below the nipple.

On the 26th I made the following notes, after carefully examining the heart: " There is at the apex a very distinct thrill, alternating with the beat of the heart, but rather preceding it

than following it. Corresponding with this and with the systole of the ventricle, one hears on auscultation at the apex and over the lower part of the heart's surface two bruits—a double bruit—I think presystolic and systolic respectively.

" At the base the heart-sounds are rather rough, but there is no diastolic bruit. A slight systolic bruit is heard along the aorta.

" The pulse is not splashing.

" In the back, on both sides, a loud systolic murmur is heard."

On May 3rd it is noted by the ward clerk, Mr. Cass, that Dr. Rees thinks there is certainly a presystolic bruit.

The pulse in this patient ranged from 105 to 96.

She went to the seaside on June 15th.

CASE 58.—Edward G—, æt. 26, was admitted into Philip Ward, under the care of Dr. Pavy, September 29th, 1869. The report of his case was taken by Mr. J. H. Ewart, medical ward clerk.

" The patient is a carman, and has had to lift very heavy weights. He has also been much exposed to vicissitudes of weather. He always enjoyed good health till one Sunday afternoon, about two months ago, when he suddenly, while walking, felt a pain rather to the right side of his chest. After a short time this pain seemed to extend across to the left side. He has also suffered from shortness of breath, increased upon exertion; and his knees and feet have occasionally become swollen, so that he has had great difficulty in moving them. He has gradually been getting worse up to the present time."

His symptoms on admission were those above described, with the addition of orthopnœa, and of some œdematous swelling of the left leg. His pulse was 68, sharp and irregular. A systolic bruit was discovered on auscultation.

On October 19th I examined him, while visiting the ward as Medical Registrar, and I made the following note :

" The systolic murmur is loudest at the apex, and to the left side ; it is not distinct in the back. At the base the heart-sounds are clear. At the apex there is a reduplicated and slightly churning sound, which comes about midway in the pause between two systolic murmurs. Is this sound due to

auricular contraction? The apex-beat is rather low, but is not displaced outwards."

He afterwards was attacked with subacute rheumatism, affecting several of the joints in succession. No change in the heart-sounds, however, was noted. He was discharged on December 18th, at his own request.

CASE 59.—William L—, æt. 18, was admitted into Stephen under the care of Dr. Habershon, November 7th, 1866. His case was reported by Mr. W. J. Bennett. He had had rheumatic fever three years before, and twice since. From the period of the second attack he had suffered from great pain in the left side, orthopnœa, &c.

He was a pale, anæmic lad, with dark hair and eyes.

The area of cardiac dulness was distinctly increased, extending down to the level of the sixth rib. The heart's impulse was diffused. There was marked drawing in at one point during the systole. The loud systolic murmur seemed distinctly to be preceded by a short presystolic bruit.

No change in the physical signs is recorded during the time of his stay in the hospital. Various medicines were prescribed, but with little good result.

He died suddenly on January 23rd. His friends refused to allow a post-mortem examination to be made.

CASE 60. (From the report of the clinical clerk, Mr. Branford Edwards.) — Caroline W—, æt. 13, admitted into Clinical Ward under my care, May 18th, 1867, for rheumatic disease of the heart. She has had three attacks of rheumatic fever, the first having occurred three years ago. Since the last attack, six months ago, she has suffered from great pain in the heart, especially when excited. She has also had much dyspnœa, and occasional swelling of the legs.

On auscultation a systolic bruit is heard at the apex of the heart, which is also very loud towards the axilla and in the back. At the base of the heart it is scarcely audible. There is bulging over the region of the heart; and the intercostal spaces are drawn in by its action.

The relation of the murmur to the apparent " second sound "

at the base and the apex respectively is very remarkable. At the base it may be represented by the following diagram :—

Syst. br. 2nd s. Syst. br. 2nd s. Syst. br. 2nd s. Syst. br. 2nd s.
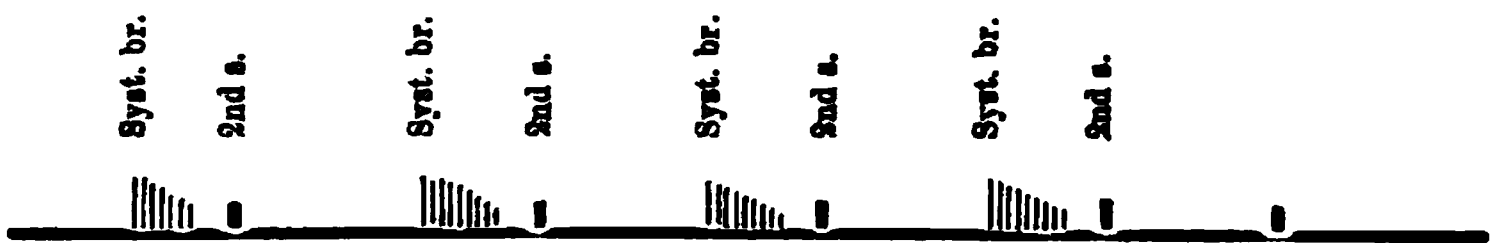
Now at the apex the systolic murmur is not only much louder but also much longer. It might therefore be expected that the interval between it and the second sound would be much lessened. But observation shows that the contrary is the case. The apparent "second sound" lies just midway between two systolic murmurs, as is shown in the diagram annexed:

Syst. br. ? 2nd s. Syst. br. ? 2nd s. Syst. br. ? 2nd s. Syst. br.
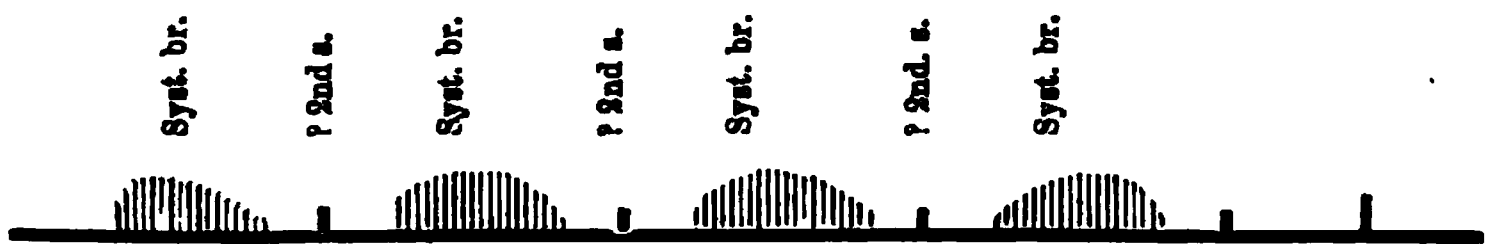
Thus, if one did not correct one's impressions by placing the finger on the carotid artery, one might almost believe the murmur to be diastolic, and the sound a " first sound."

There appear to be two possible explanations of these facts: Either the systolic murmur must begin earlier at the apex than at the base, in which case the two diagrams should be read as under:

Syst. br. 2nd s. Syst. br. 2nd s. Syst. br. 2nd s. Syst. br. 2nd s. Syst. br.
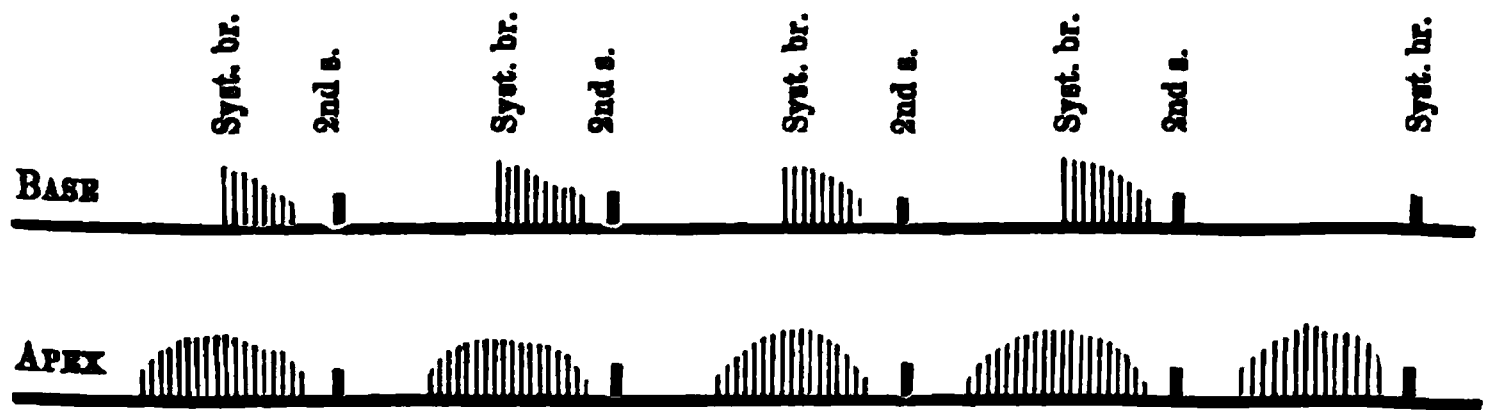
BASE

APEX

Or, on the other hand, if the commencement of the murmur occurs synchronously at the base and apex, the apparent "second sound" cannot be really the "second sound," but must be a presystolic sound; the relation of the two diagrams would then be as follows :—
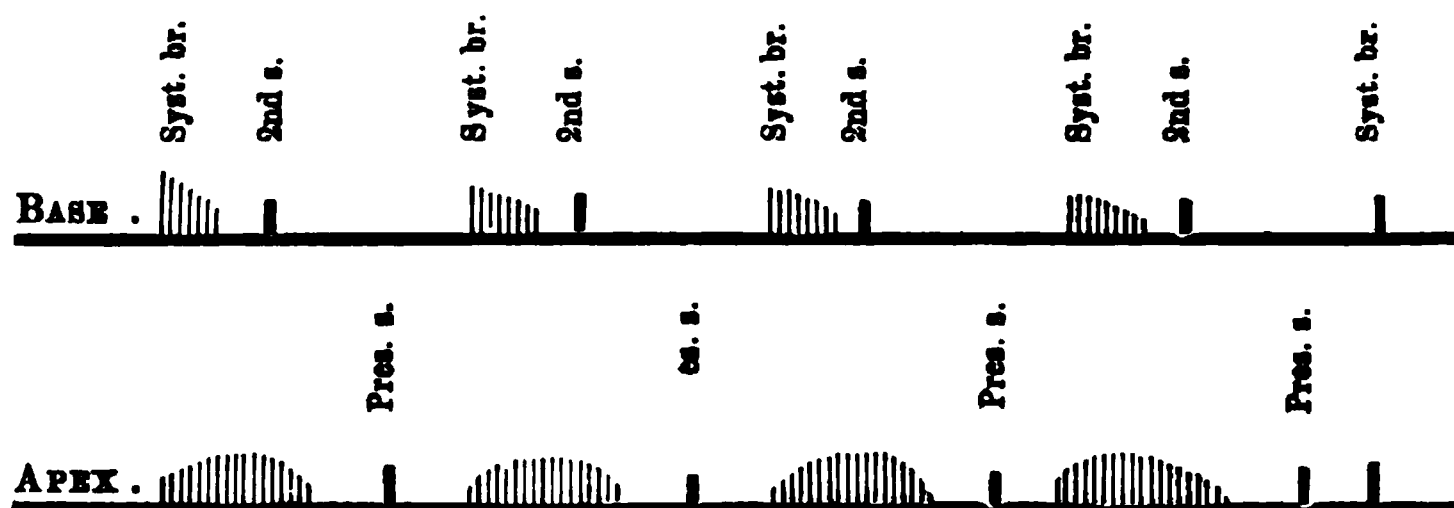
" May 16th.—She is to take vini ferri ʒss three times a day; and to have a draught containing infus. digitalis ʒj, spir. æth. nitr. ℞xx at bedtime.

" 19th.—She says she slept better the first night, when she had the digitalis, than she had done for some time past; and that she cannot sleep without it. The same draught is therefore ordered to be given three times a day, as well as at bedtime.

" 21st.—She has slight rheumatic pain in the left shoulder, but says that she feels better, and breathes more easily. Pulse 104.

" 22nd.—There is slight œdema over the right tibia. Pulse 90."

The further notes do not report much alteration in her condition. She went out on June 19th, "somewhat relieved."

CASE 61. (From the report of Mr. Eugène S. Hart.)—George S—, æt. 10, was admitted into Stephen Ward, under Dr. Wilks's care, April 7th, 1869. He had had rheumatic fever twelve months before, and had complained ever since of pains over the heart and in the shoulders. He had not suffered from palpitation.

The præcordial dulness was much more extensive than natural. The impulse was both diffused and heaving. The seat of the apex-beat corresponded with the seventh rib, external to the nipple. There was a loud systolic, almost musical, murmur heard over the surface of the heart, as well as towards the axilla, and in the back.

At the apex there was a distinct presystolic sound (not a murmur). The second sound was there inaudible.

CASE 62.—Emily G—, æt. 23, admitted into Lydia Ward, under the care of Dr. Rees, June 26th, 1867. The notes of her case were taken by Mr. Frederick Robertson, medical ward clerk.

Eight years ago this patient was in Martha Ward for rheumatic fever. Her first attack of palpitation and other symptoms of heart disease was more than three years ago.

Condition on admission.—She presents the appearance of a person suffering from oppression at the chest, and difficulty of breathing. She has to be propped up in bed with pillows. Her hands are bathed in profuse sweat. The lower limbs are very much swollen.

I happened to examine her soon after her admission, and made the following note : " The heart's impulse is diffused. The second sound is clear at the base; but at the apex the diastole is accompanied by a kind of double sound, and a slight thrill is felt at the same moment by the finger." I did not state that there was a systolic bruit, probably because this fact had been already mentioned by Mr. Robertson.

On June 29th I made a second note : " The heart's action is still very disturbed. At the apex the first sound (bruit) seems to be followed now by a second sound, now by another distinct bruit. I cannot make out a diastolic bruit at the base."

Various remedies were prescribed, but with only temporary benefit. She died on July 29th. No post-mortem examination was made.

CASE 63.—M. A. G—, æt. 29, was admitted into Mary Ward, under the care of Dr Wilks, October 21st, 1867, suffering from dropsy dependent on disease of the heart, which, she said, had existed for many years. Her case was reported by Mr. Elphick. She had never had rheumatism. The apex-beat of the heart was situated an inch or more outside the nipple, and a loud systolic murmur was audible over an extensive area. She derived much benefit from the administration of tinct. digitalis in ♏x doses, and left the hospital on November 24th.

On June 24th, 1868, she was readmitted into the Clinical Ward under Dr. Moxon's care. She was then observed to have a double bruit, consisting of presystolic and systolic elements.

Notes of her case were now taken by Mr. Richard Stephens, clinical clerk.

" A month ago, while washing some dishes, she was seized with great giddiness, and fell on the floor. She was taken up by her friends, and it was found that she had lost the use of her right side. This gradually passed off in the course of the next week.

" She is a small woman, with dark hair and eyes, dilated pupils, and a very sallow, dusky complexion.

" The apex-beat of the heart is between the sixth and seventh ribs, two inches below, and two and a half inches to the left of the nipple. The heart's action is most irregular. A loud systolic bruit is heard with about every third beat; it is loudest rather internal to the seat of the apex-beat, at which spot, on the other hand, a presystolic bruit is audible."

She was ordered to take pil. diuret. c̄. calomelane i, twice a day. This treatment was continued until July 11th, by which time she was much improved; and a week later she could walk about the ward. She was discharged relieved on July 31st. The two bruits remained unaltered.

She was admitted for the third time on October 27th, 1868, into the Clinical Ward, under the care of Dr. Rees. She had a return of the dropsy, and the urine was albuminous; but she again went out relieved. The report taken on this occasion does not throw any fresh light on the character of the physical signs.

CASE 64.—Mary Ann J—, æt. 24, was admitted into Mary Ward, under the care of Dr. Wilks, on November 6th, 1867, suffering from heart disease, chronic phthisis, and an enlargement of the abdomen, about the nature of which there was a doubt, but which was probably either an ovarian tumour or due to strumous peritonitis.

The report of her case was taken by Mr. Mallam. It is necessary in this place to quote from it only the fact that there was heard, most marked at the apex, a distinctly double bruit, consisting of presystolic and systolic elements. She suffered from orthopnœa, palpitation, and pain in the region of the heart.

She had had six attacks of rheumatic fever; the first when she was ten years old.

Under the administration of pulv. scillæ and pulv. digitalis, in doses of a grain of each twice a day, she improved considerably. She afterwards took the tinct. ferri perchlor. with tinct. digitalis ℳx three times a day. She was discharged relieved on November 6th. On December 12th, Dr. Wilks made the note that at that time there was no presystolic bruit, or only a very slight one.

On March 10th she was readmitted under my care. The report was then taken by Mr. F. S. Tuck. It is stated that two bruits, a presystolic and a systolic, were then distinctly audible. She remained in the hospital a month.

In the following instances there was disease of the aortic valves, as well as of the mitral.

CASE 65.—Charles Philip O—, æt. 12, admitted into Stephen Ward, under my care, January 30th, 1867. His case was reported by Mr. R. M. Cole, medical ward clerk.

" His mother states that he has always been delicate, and that three years ago he had rheumatic fever. During the last year or two he has complained of pain in the chest, sometimes on one side, sometimes on the other. About six weeks ago he caught cold, and since that time he has suffered from palpitation of the heart, which has gradually got worse.

" He is a very anæmic boy, of fair complexion.

" There is bulging of the præcordial region, and the heart's impulse is strong and heaving. The apex-beat is situated a little to the left of the nipple. Over the aortic valves there is a double bruit (systolic and diastolic). At the apex there is also a double bruit (systolic and ? presystolic)."

The physical signs were more exactly laid down by myself on March 1st, after repeated examination, in the following terms :

" The linear extent of dulness downwards and to the left from the third costal cartilage now measures five and a quarter inches. There is very marked impulse in the epigastrium. A thrill distinctly precedes the apex-beat and the pulse in the carotid.

" At the base there is a double murmur (distinctly systolic and diastolic).

" At the apex there is likewise a double murmur. I think that the carotid pulse is decidedly synchronous, not with the first, but with the second part of this murmur."

His pulse ranged from 110 to 120. The treatment consisted in the administration of diuretics and tonics alternately, or in combination. The report does not speak of their use as having been attended with any very striking good effects. He went out, relieved, on March 14th.

CASE 66.—Henry L—, æt. 12, was admitted into Stephen Ward, under the care of Dr. Wilks, on November 24th, 1869. His case was reported by Mr. H. G. Button.

" He had had scarlatina five years, and rheumatism for the first time two years, before his admission. Four months ago he again got rheumatic fever, and from that time he has had great pain at the heart on the least exertion.

" He is a delicate-looking boy.

" The apex of the heart beats much outside the nipple. The impulse is unnaturally powerful. Over the base a loud to-and-fro bruit is heard (systolic and diastolic), which is carried downwards along the sternum. At the apex presystolic and systolic bruits are audible, heard also in the axilla, and slightly behind. There is regurgitation into the jugular veins. Pulse 90."

He was ordered a mixture containing the tinct. and the decoct. senegæ, three times a day, and he left the hospital, relieved, on December 8th.

We are now, I think, in a position to draw the following conclusions from the facts before us :

I. The positive value of the direct mitral or presystolic (this word being used in its wider sense) murmur is very great. The number of recorded cases in which such a murmur has been heard during life, and a post-mortem examination has shown the mitral orifice to be contracted, appears to amount at the present time to twenty-eight. The following list states what number of cases have been given by the various writers quoted in the earlier part of this communication :

Fauvel has recorded	8 cases.	
Gairdner . .	4	„
Gull and Wilks .	1	„
Rees, Gull, and Moxon	2	„
Hayden . . .	8	„
Peacock . . .	2	„
Simpson . . .	8	„
Hyde Salter . .	2	„
Sutton . . .	1	„
	21	
Those related in the present paper amount to	7	
	28	

Hitherto, 1 believe, no single instance has been recorded in which a presystolic murmur has existed during life, and in which the mitral orifice has not been found after death to be very decidedly narrower than usual. It has been supposed by some writers that a mass of vegetations growing from the auricular surface of the valve might obstruct the flow of blood sufficiently to give rise to such a murmur. This may be; but I have found no recorded instance of it. Even its theoretical possibility is, I think, doubtful; for I am much inclined to believe that an essential element in the production of the presystolic murmur is the vigorous jet of blood caused by an hypertrophied auricle; and this of course implies a chronic obstruction, such as no mere mass of vegetations would be likely to produce.

II. The cases recorded under the first and second heads in this communication would appear, at first sight, to show that very little importance can be attached to the *absence* of a presystolic bruit, as *disproving* the existence of mitral contraction. Among forty-seven cases in which this disease has been found in the post-mortem room during the last four years, there have been only seven (or even, perhaps, six) in which a presystolic murmur had been heard during life. In the remaining forty cases the presence of contraction of the mitral orifice was undiagnosed. But from this number very considerable deductions have to be made in estimating for clinical purposes the practicability of determining the lesion in question. In no less than fifteen of the forty cases the patient either died of injury or operation in a surgical ward, or, if he lay in a medical ward, succumbed within a few hours after his admission, so that there was either no reason to suspect any heart affection, or no accu-

rate physical examination was made. These cases are those numbered 12, 13, 16, 18, 19, 21, 26, 27, 31, 34, 35, 40, 41, 46, and 47 respectively.

Again, in almost all of the twenty-five cases which are left, the condition of the patient during the fatal illness was such as to throw great difficulties in the way of an exact determination of the heart-sounds, and of their rhythm. In a very large proportion of these cases the pulse was extremely rapid, and the action of the heart very irregular.

If we now turn to the six or seven cases in which the nature of disease was determined during life by the presence of a presystolic murmur, we shall find a very remarkable contrast. In almost all these cases the heart was beating slowly at the time when the murmur was first recognised. Moreover, there were only two instances in which the cause of death was the heart disease alone, and in which the bruit was perceived shortly before death. In two of the remaining cases the patient died, directly or indirectly, of gangrene of a lower limb from embolism. In each of the two or three cases which are left he or she was discharged from the hospital, but was subsequently readmitted, and then succumbed. In no one of these two or three cases does it appear that a presystolic murmur was heard during the fatal illness.

We must further bear in mind that during the same period there have been admitted in our wards sixteen[1] other patients in whom a presystolic bruit has been heard, but who have left the hospital with their symptoms more or less relieved.

The time, therefore, at which a presystolic bruit is discovered is usually removed by a considerable interval from the date of the patient's death, unless indeed this arise from some very serious complication, superadded to the more direct efforts of the valvular lesion. I am quite prepared to admit that if a patient be suffering from cardiac dropsy, if the heart be beating rapidly and irregularly, and if perhaps there be in addition a loud systolic murmur, the non-discovery of a presystolic bruit goes but a very little way to disprove, or even to render improbable, the existence of mitral contraction.

On the other hand, I think it is yet to be proved that such

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[1] Three of the nineteen cases placed under the third heading terminated fatally; but no post-mortem examination was made to verify the accuracy of the diagnosis.

an affection of the mitral valve can be present in any marked degree, and yet, while the heart is beating steadily and quietly, no presystolic bruit be at any time discoverable. It is not sufficient, however, to examine the heart once or twice only, for experience has shown how inconstant these murmurs are; and auscultation ought also to be practised, not only while the patient is lying quietly in bed, but also after he or she has been making some slight muscular effort. Moreover, the sounds of the heart must always be checked by feeling the heart's impulse or the carotid pulse. The report of Case 2 shows sufficiently that, unless this precaution be adopted, even a well-marked presystolic bruit may be overlooked.

There are still some interesting questions in reference to the clinical history of contraction of the mitral orifice, on which light is thrown by the cases above recorded.

And, firstly, as regards the causation of this disease. I have long been struck by the comparative rarity with which one obtains a history of a past rheumatic attack from a patient in whom a presystolic bruit is audible. And I know that Dr. Moxon has made the same observation. Thus among the seven fatal cases related under the first head, there was only one in which the most careful inquiry succeeded in eliciting that the patient had ever had rheumatism.

On the other hand, among the eighteen cases placed under the third head (in which a presystolic murmur was heard, but the patient was discharged relieved) there were only four in which the past existence of rheumatism was positively negatived on inquiry. But in three of these four cases (Cases 49, 54, 56) the presystolic bruit was peculiarly distinct and well marked.

Of the forty patients whose cases come under the second head a very considerable proportion had had rheumatic fever, or, at any rate, rheumatic pains. There are only some five or six of them who can with tolerable confidence be said to have been always free from any such illness.

These facts tend undoubtedly to favour the view that in a large proportion of cases the contraction of the mitral orifice is due to some cause other than the mere circumstance that the endocarditis of a past rheumatic attack had fallen with especial severity on the valve in question.

In some cases it would appear that narrowness of the mitral valve may be a congenital defect. It was so, perhaps, in Case 19. The orifice would admit only one finger, but its margin was quite thin. But there is no evidence that a presystolic murmur had existed in this case ; and probably there had been no such murmur, for the auricle was not enlarged nor hypertrophied. Dr. Peacock[1] has expressed his belief that some forms of valvular disease are congenital ; and my friend Dr. Kelly,[2] of King's College, has exhibited a specimen at a meeting of the Pathological Society in support of the same opinion.

Patients in whom a presystolic bruit is audible, and who have not had any rheumatic affection, generally say that the palpitation and dyspnœa from which they suffer have come on very slowly, often during a period of several years. 1 am, therefore, inclined to believe that the contraction of the valves, and the thickening and adhesion of the chordæ, are the results of a very slow process, not attributable to any cause at present known, and essentially one of chronic inflammation. It is to be borne in mind that in a large proportion of cases the tricuspid valve presents a similar change, though in a less degree ; and that not infrequently the aortic valves also are similarly affected.

In one instance (Case 49) the earliest symptoms were attributed to a strain in moving a piano. Another patient (Case 23) declared that she had been in perfect health until she was frightened by the occurrence of a fire in her master's house, when she thought that she caught cold.

I have repeatedly been asked by students whether the prognosis in a case of contraction of the mitral orifice is more or less grave than in a case of any other valvular disease, and particularly than in one of " mitral regurgitation." This question, however, is one of extreme difficulty, and, indeed, can in my opinion receive no direct answer. I have already shown that the discovery of a presystolic bruit is usually made at a period remote from the patient's death, unless this be caused by some complication. But this must be taken as proving, not that contraction of the mitral orifice is comparatively unattended with danger to life, but that when dangerous it is usually

[1] 'On some of the Causes and Effects of Valvular Diseases of the Heart,' 1865.
[2] ' Path. Trans.,' xxi, p. 91.

obscure. Thus the prognosis of a case in which a presystolic bruit is audible would by no means be the same thing as that of a case of contracted mitral orifice. Further, the rarity of a rheumatic history in the former class of cases shows that they constitute to some extent a group apart from the rest.

A yet more serious difficulty in answering the question I have just put concerns the so-called " regurgitant mitral disease." The cases included under this head are still further than those of " contraction " from forming a homogeneous class, having a clinical history of its own. The most definite group among them seems to be that in which the mischief commences by the rupture of one or more of the chordæ; and this, I believe, is a very fatal affection. In another large group the dilatation of the left ventricle has probably much more to do with the symptoms, and even with the physical signs, than the valvular insufficiency. And, again, there are the cases of ulcerative endocarditis, the clinical features of which (as was shown by Dr. Wilks in the last volume of these ' Reports ') are mainly due to contamination of the blood with morbid materials.

In collecting the cases for this paper, I have been very much struck with the frequency of arterial embolism in contraction of the mitral valve. In five out of the seven fatal cases in which a presystolic murmur was heard, there had been embolism either of one of the cerebral arteries, or of some artery of the lower limb. And in at least four other fatal cases the same complication had been present. The embolon appears to have been a portion of ante-mortem clot from the auricular appendix, more often than a mass of vegetations detached from the valve; and this, perhaps, is the reason why it has more than once been large enough to obstruct the main artery of the thigh.

It is, perhaps, worthy of note that in at least two cases in which cerebral symptoms existed during life, the autopsy failed to reveal their cause (Cases 5, 36). The same fact has been recorded in one of the papers on this subject, which I have already quoted; but I am unable at the moment to give the exact reference.

It has been thought by some observers that the pulse affords valuable evidence in cases of mitral contraction, it being

necessarily small, in consequence of the difficulty in the left ventricle getting filled.[1] My own observations, however, are entirely opposed to this view. It has appeared to me that in the great majority of cases in which a presystolic murmur has been heard the pulse has presented no indications whatever of the existence of disease. In the later stages, no doubt the pulse is often very small and irregular; but as far as I can learn this state of pulse gives no indication of the existence of mitral contraction, rather than of a feeble dilated condition of the ventricle, or of any of the other lesions which may give rise to a " cardiac dropsy."

In the earlier part of this paper I have quoted, perhaps at tedious length, the views of writers on the subject of heart disease within the last thirty years. My object in doing so was twofold. On the one hand I wished to show that the accumulation of evidence in favour of the presystolic theory was now very strong; on the other hand, that there were still observers of great experience and authority, who either ignored it altogether, or deliberately rejected it after full consideration of the subject.

Now, it is in the first place to be remarked that those writers who deny the possibility of diagnosing contraction of the mitral orifice by means of the presystolic bruit have nothing to put in its place. They almost all assert that the diastolic mitral murmur is very rare; and they are, in fact, exactly in the position of all English observers fifteen or twenty years ago, who believed it to be practically impossible to distinguish between " contraction " and " dilatation " of the mitral orifice.

It is therefore a matter of some interest to trace, if possible, the source of the error which all who admit the presystolic theory must believe to lie in the observations of those who differ from them.

Dr. Hyde Salter, in his lecture on this subject already referred to, has given an explanation which, if it could be admitted, would be eminently satisfactory. " How is it," he says, "all this was not known before? Because it was not known that the auricular contraction was confined to the presystole." . . .

But unfortunately, as has already been shown by Dr. Wilks in the present volume, this view on examination turns out to

[1] Dr. Paul Niemeyer says, "Puls stet klein (mitralpuls)," op. cit., p. 167.

be untenable. A reference to the older editions of Dr. Carpenter's work on 'Physiology' will show that for nearly thirty years the account of the times of contraction of the auricles and ventricles has been given exactly as it is given now. In fact, as we have seen, Fauvel, when in 1843 he described the presystolic murmur as diagnostic of contraction of the mitral orifice, explained that murmur exactly as we explain it at the present day. Dr. Hope would appear to have been the discoverer of the fact that the contraction of the auricles is instantaneously followed by the ventricular systole.

I quite agree with Dr. Salter, however, in thinking that the presystolic murmur must have been taken by the physicians of the last thirty years for a systolic murmur. As we have seen, it is not in reality rare. Since, therefore, these physicians admitted only systolic and disastolic murmurs, and thought a diastolic mitral murmur so uncommon as to constitute a clinical curiosity, there is no alternative but to suppose that they regarded as systolic the murmur which they heard.

There is, indeed, collateral evidence that this was the case. The observers of the present day are agreed that the presystolic murmur is of all murmurs the one most frequently accompanied by thrill perceptible to the hand (frémissement cataire, Katzenschwirren), and that this thrill is, like the murmur, presystolic in rhythm. Now I find, on perusal of their works, that the writers who describe the direct mitral murmur as diastolic and as very rare, uniformly speak of the frémissement cataire as systolic in rhythm. Can it be doubted that in practice they regarded the murmur also as systolic?

Thus Dr. Walshe[1] says, " I do not remember ever to have observed cardiac thrill synchronous with the ventricular diastole; tricuspid and mitral constriction, as well as aortic regurgitation, have consequently not in my experience led to its production." In a footnote he adds, " If mitral constriction be present, the thrill of coexisting regurgitation will be thereby rendered more intense."

This passage is the more remarkable because it certainly is no mere random statement, but the result of careful investigation on the part of Dr. Walshe. In his earliest edition[2] he

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[1] Op. cit., p. 86.
[2] 'A Practical Treatise on the Diseases of the Lungs and Heart,' 1851.

expressly refers to Skoda, as having said that purring tremor especially attends mitral constriction, and must therefore be diastolic in rhythm.[1]

We must, then, conclude that presystolic murmurs were formerly generally taken for systolic. But this is not, I believe, the only mistake which was made in such cases. I cannot but think that the first sound was at the same time supposed to be the second sound. In the early part of this paper I have shown how very easily this error may be committed, and how constantly it is in fact committed by students and others; the presystolic murmur indeed bearing to the first sound very much the relation which a systolic murmur would bear to the second sound. I have since found that both Dr. Gairdner[2] and Dr. Sanders[3] have drawn attention to the circumstance that in these cases the first sound is apt to resemble a second sound very closely. Dr. Markham, too, in his paper on the " Diastolic Mitral Murmur " already referred to, says that he has on more than one occasion seen experienced observers mistake the first for the heart's second sound, when the action of the organ was great.

But further :—I am very much inclined to suspect that even now many of those observers who correctly diagnose the presystolic murmur in a case of contracted mitral orifice do nevertheless mistake the first sound for the second sound, believing the first sound to occur at the end of, and to be swallowed up in, the murmur, whereas it is in truth separate from it. Thus, in one of the cases already referred to, in which an autopsy

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[1] In connection with this subject it is very interesting to observe that when this thrill was first discovered,—before auscultation was invented by Laennec,—it was known to be diastolic, as is evident from the explanation then given of its origin. In Corvisart's ' Treatise on the Diseases and Organic Lesions of the Heart and Great Vessels,' translated by Mr. Hebb in the year 1813, occurs the following passage, at p. 206:

" The obscurity which envelopes the signs of the contractions of the right orifices is not entirely removed from those which characterise the imperfect obliteration of the left auriculo-ventricular aperture. . . . . In this number is a particular rustling, difficult to describe, perceptible to the hand when placed on the præcordial region, and which, doubtless, proceeds from the difficulty which the blood experiences in passing through an aperture, no longer proportionate to the quantity of fluid to which it has to give vent."

[2] ' Med. Times and Gazette,' 1865, i, p. 275.

[3] ' Edinburgh Med. Journ.,' 1869, January, p. 588.

verified the diagnosis, we find it recorded[1] that "the first sound of the heart was so exceedingly feeble that it was very difficult to say in what relation this murmur (diagnosed as auricular-systolic) stood to the first sound of the heart. The loudly marked second sound, however, was readily heard, and immediately afterwards the rough prolonged murmur." It may appear a very bold assertion, but I cannot refrain from asserting that the sound described as the second sound in this quotation was really the first sound of the heart.

This point is of the more importance, as it appears to me to afford an explanation of the very great discrepancies which are met with in the different papers on this subject, with regard to the difficulty of recognising the presystolic bruit. There are some observers who maintain that it is " the most easily detected of all the cardiac murmurs ;" there are others who regard the diagnosis of a presystolic from a systolic ventricular murmur as " one of the most difficult tasks in the physical examination of the heart, and as often all but impossible." The discrepancies will be at once accounted for if we suppose that the observers last referred to have been endeavouring to disentangle the murmur from an imaginary first sound, which they conceived to be blended with it, and to have mistaken the real first sound for the second sound.

As I have already stated (p. 251), I believe that by auscultation alone this error cannot in all cases be avoided. It is necessary to control the heart-sounds by some other method of determining the ventricular systole. For this purpose I prefer to feel the carotid pulse. I have more than once found it impossible to feel the apex-beat of the heart satisfactorily when there has been a marked presystolic thrill, and when the stethoscope has necessarily been close to my finger. Dr. Gairdner speaks highly of the use of the binaural stethoscope of Dr. Scott Alison for this purpose; but the trials which I have made with this instrument have convinced me that it is more easy for me to determine the systole by feeling the carotid pulse.

It remains for me to describe certain rare changes in the

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[1] 'Med. Times and Gazette,' 1866, i, p. 90.

cardiac rhythm, which I believe can be shown to be essentially modifications of the presystolic murmur, and to be equally indicative of the existence of mitral contraction.

In the summer session of 1869 a patient was under my care in the Clinical Ward, in whom a bruit was audible, which was entirely unlike anything that I had ever before heard.

The following are the notes of the case, from the report of my clinical clerk, Mr. Mallam :—

CASE 67.—" Harriet H—, æt. 42, was admitted into the Clinical Ward, under the care of Dr. Fagge, July 3rd, 1869.

" She is a married woman, and has had four children. She has never had rheumatic fever, nor chorea, nor does she remember to have suffered even from rheumatic pains. Eighteen months ago she had a bad miscarriage. She was confined six months since, and has been nursing her baby up to the present time. The labour was protracted, and she was long in getting about again. After her confinement her abdomen gradually began to swell, and she has not since menstruated. She has had much pain in her back and loins. She did not notice that the swelling began in any particular region of the abdomen.

" For the last six weeks she has not been out of bed. Her breath has been very short, and she has had a bad cough, and has spat blood and matter. Her breath is better now, but she has not been able to lie down during the last few nights.

" Her appetite is pretty good. Her bowels are open regularly ; defæcation sometimes gives her great pain.

" On admission she walked into the ward, with the usual carriage of a patient having an enlarged abdomen. She looks ill, and her hair is getting grey.

" The enlargement of the abdomen is principally in the antero-posterior diameter, but there is a little lateral bulging. The abdomen measures forty-one inches in circumference at the level of the umbilicus, and twenty inches from the ensiform cartilage to the pubes.

" The skin of the abdomen does not pit on pressure. There is resonance on percussion from above to within three inches of the umbilicus ; below this, and in the loins, the percussion note is dull. Fluctuation is distinct in all directions. The walls are sufficiently loose to allow the fingers to be dipped down for some

distance, but no tumour can be discovered in any part of the abdominal cavity. There is a little tenderness in the upper part. She has no pain in the abdomen when at rest, but she has pain in the back and loins, and frequently in the legs. The veins of the front of the chest are distended, and have been so for four months. Those of the arms are likewise swollen. This is less marked now than it was some time since.

" The pulse is extremely slow, 34 when first counted; 43 when the report of her present condition was being taken.

" The heart's rhythm is regular, but the first sound is prolonged into a murmur; and after a clear, sharp second sound, there is a murmur of wavy character; this is followed by a pause, and then the first sound is heard again. The dulness on percussion over the heart commences about the fourth rib. The apex cannot be felt, on account of the swollen state of the breasts.

" Anteriorly the chest is resonant on percussion; the expiratory act is rather prolonged on both sides. Posteriorly the left side is rather dull at the base, where there is slight bronchial breathing, and the inspiratory murmur is also deficient.

" The urine is of sp. grav. 1030, thick even when passed, and depositing a large quantity of urates on standing. It contains no albumen, but much purpurine and plenty of chlorides. Tincture of galls renders it very thick and cloudy."

On July 2nd the temperature in the groin was 98·7°; that in the axilla was taken at 97·3°; but there was a difficulty in keeping the thermometer in position, owing to the distended state of the breasts.

At the time of the patient's admission the point chiefly discussed in reference to her case was the cause of the abdominal enlargement. It was even doubtful whether the fluid might not be contained in a thin-walled ovarian cyst. She took little medicine, with the exception of five-grain doses of iodide of potassium in compound infusion of gentian three times a day, and a Dover's pill at night. On July 9th paracentesis was performed; ten points of a clear green liquid were removed. It was neutral to test-paper; its sp. gr. was 1014; it turned almost solid when boiled; after separating the coagulated albumen, the filtrate was found to contain abundant chlorides and phosphates.

After the tapping the abdomen appeared for a time to be

filling again.   On July 15th the circumference at the umbilicus was thirty-four and a half inches.   Subsequently, however, it gradually decreased.   On August 1st the liver was for the first time felt to be enlarged.

As the gravity of the abdominal symptoms diminished, the state of the heart attracted more attention.   The pulse, noted day by day, was found to beat from 30 to 40 times per minute.

On September 3rd the following notes were made by Mr. T. P. Douglas, B.A., the then clinical clerk of the case :

" Her general condition is much the same.   The pulse is 34. She still complains of pain at the lower part of the right chest anteriorly, and here a distinct leathery rub is heard, for which a blister is to be applied.   The bruits, which were at first localised at the base, are now diffused.   To each beat of the pulse there are four sounds (or five at the base); a "first sound" followed by a bruit; a second more feeble sound followed by another bruit, and succeeded by another short feeble sound.   It appears almost as if the beats went in pairs, the first loud one being followed by a second weaker one, and this again by a long pause."

On September 22nd, before the patient was discharged from the hospital, I made a careful examination of the cardiac region, and wrote down at the time the following notes :

" The heart's impulse is widely diffused.   Even the sternum is slightly raised by it, and it can be plainly felt even to the right of that bone.   It also reaches externally to the left nipple. The most definite ' apex-beat ' is situate between the fifth and sixth ribs.   Here there is a distinct drawback; and at times I think a feeble subsequent pulsation can be felt, following the first.

" The systolic murmur appears loudest and most blowing between the fourth and fifth costal cartilages, near the sternum; its intensity diminishes both towards the axilla and towards the ensiform cartilage.

" Below the fifth rib the second sound, although rather thick and like a ' thud,' is not followed by any murmur.   But above this region it is followed by a most remarkable *wavy* bruit. This wavy bruit is, and always has been, loudest about the second left costal cartilage, close to the sternum ; and it has at this spot a musical quality, almost wanting elsewhere.   Here

also I think that there is no interval between the second sound and the bruit; but lower down there is an interval, the bruit seeming to belong to a distinct movement of the heart, or of some large vessel during the pause.[1]

"The rhythm of the heart-sound at the base may be best indicated by the accompanying diagram.

"No presystolic bruit is audible, nor has any ever been discovered, even when the patient has been made to walk up and down the ward.

"The liver extends rather more than three inches below the rib-cartilages in the mammary line; its sharp edge can distinctly be felt. She still occasionally complains of some pain at the lower part of the right chest. Pulse 33."

On September 25th she left the hospital.

While this patient was in the Clinical Ward, her case excited considerable interest. She was seen by several of my colleagues; and I believe that their observations were in general accordance with the description above given of the physical signs. On one occasion it happened that Dr. Gairdner of Glasgow visited the ward while I was going round, and I asked him to examine the patient. This he very kindly did; and he subsequently spoke of the murmur as very puzzling and anomalous.

It will be observed that the peculiar features in this case were the extreme slowness of the pulse, and the presence of a wavy, partly musical murmur audible at the second left costal cartilage, extending considerably to the left of the sternum along the cartilage, not carried along the sternum downwards, following the second sound, but not everywhere continuous with

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[1] To these points might have been added that the "wavy" character of the bruit, of which the first part was musical, gave one the idea that the movement causing it was of a "rolling" or "tumbling" character; it was also propagated horizontally along the second intercostal space in a way which seemed unusual.

it, separated from the next first sound by a considerable interval. It occurred, therefore, during the diastole, at a time when the whole of the heart is naturally at rest; and yet it gave one the impression of being produced by the tumbling, rolling movement of some part of the organ.

Two views suggested themselves at the time as possible explanations of this remarkable bruit.

Firstly, it appeared to be conceivable that, supposing an opening to exist between the aorta and the pulmonary artery, the recoil might cause a higher pressure in the one than in the other vessel, and so a flow of blood through the opening, producing a bruit.

Secondly, it appeared possible that the case might be one of contracted mitral orifice, and that the basic murmur might be due to the systole of an hypertrophied auricular appendix, occurring so early that it seemed to follow a second sound, rather than to precede the next first sound.

In favour of this last view it was noted that occasionally a slight second beat seemed to be discoverable at the apex. One could explain this by supposing it to be due to the flow of blood through the narrowed mitral, impinging on the point of the left ventricle; it would have been unintelligible on the other hypothesis.

Opposed to the view that the case was one of contraction of the mitral orifice was the fact that no presystolic murmur was ever audible.

It may perhaps appear to some of those who read this paper that the murmur may have been due to regurgitation through the aortic orifice. I can only say that no one who examined the patient ever expressed the opinion this could be the case. The character of the murmur, the direction in which it was propagated, and the pulse, all negatived such a view.

In October, 1870, more than a year after she left the hospital, I sought this patient out at her own house, having heard nothing of her since her discharge. I found that she had had no return of the ascites, and that she was able to do a little work for her family, and was consequently unwilling to return to the wards of the hospital. However, she afterwards attended for a time as an outpatient, and I made the following notes of her condition:

" The pulse now beats 44 times in the minute.

" At the apex there is a slight systolic murmur; the second sound is clear. There is no trace of any presystolic bruit.

" The bruit following the second sound is loudest just behind the left second costal cartilage, close to the sternum. It is scarcely audible along the aorta.

" At the root of the neck a good deal of pulsation is visible. No part of this can be distinctly felt to occupy the jugular vein, rather than the carotid artery."

On October 11th she was ordered to take vin. ferri, tinct. digitalis, ā. ℞x, t. d.

A week later she returned to the hospital, and said she felt better and stronger; since then I have not seen her.

The general result of my examination at this time was that the bruit following the second sound still presented its peculiar rhythm, but that it had faded (so to speak) and lost its marked musical quality. She was able to do a good deal of household work, but was quite unfit to leave the house and walk in the street, on account of the dyspnœa which was produced by even slight exertion.

In the course of the present autumn a patient was admitted into the Clinical Ward, under my care, whose heart presented physical signs which in some respects were strikingly similar to those which had been observed in the case of Harriet H—.

This patient, Eliza B—, had been under my observation since the month of April, 1868, presenting a most marked presystolic bruit. She had twice before been an in-patient; and a report of her case has already been given in an earlier part of this paper. (Case 54.) The presystolic bruit was present on almost every occasion in which she was examined; but even in August, 1869, I one day observed that the character of the bruit had altered; there was now a distinct interval between the bruit and the first sound; and towards the base the second sound was double, and seemed to be immediately followed by the bruit. A fortnight later I noted that the pulses at the wrist were alternately weak and strong, as also were the sounds of the heart.

It was not, however, until the admission of Eliza B— into the hospital for the third time during the past autumn (1870)

that attention was prominently drawn to the fact that the physical signs occasionally presented very remarkable deviations from those which one is accustomed to observe in cases of contraction of the mitral orifice, attended with presystolic bruit.

She was placed in the Clinical Ward, under my care, on September 6th, 1870.

I now found that the rhythm of the heart's action was liable to sudden and inexplicable changes. On one occasion, for instance, when the stethoscope was first applied, the heart was beating 68 in the minute, and the presystolic murmur was most marked and characteristic. Suddenly the pulse at the wrist fell to 46. However, on listening at the base of the heart at this time I found that the sounds exceeded those belonging to this number of pulsations; in fact, for each radial pulsation four sounds appeared to be heard. This gave me very much the same impression as if the beats of the heart occurred in pairs, the former of the two only being forcible enough to produce a pulse at the wrist. This view seemed at first to be confirmed by the fact that in the neck two beats could be felt to every radial pulse, one therefore corresponding with each pair of sounds heard at the heart's base, and altogether 92 in the minute.[1] But on closer examination it was discovered that these two beats took place in different vessels; the one deeply in the carotid, as it appeared; the other, more superficially, and probably in a vein. This fact was observed on several distinct occasions; and was demonstrated to the clinical clerks and students. With a little care I could receive the two beats on different sides of the finger, pressed backwards just internal to the sterno-mastoid muscle.

Since the time when these facts were first noted I have repeatedly examined the patient, and the following are the chief points which I have observed:

The heart is still liable to the remarkable change of rhythm which I have described above, and which is easily detected by the alteration in frequency of the pulse. When first felt, this may perhaps be about 70; it will suddenly fall to about 45; and then the peculiar double rhythm is discovered on ausculta-

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[1] It may be observed that 68, the number of beats which the heart made when pulsating regularly, is almost exactly the arithmetical mean between 46 and 92.

tion. On one or two occasions, however, I have thought that I could feel a feeble double pulse even in the wrist.

Within the last two or three weeks (December, 1870) the heart's action has been much more steady; and the peculiar double rhythm has but seldom been observed. The patient herself is inclined to ascribe this to the fact that she is not now taking digitalis, a medicine which was given her in small doses when she was first admitted, and which appeared at the time to have a very beneficial action in relieving her symptoms. The double rhythm, however, still occasionally manifests itself, even when she is in bed; and I have lately discovered a method by which I believe I can induce it at will. If the patient be made to walk a few yards up the ward, she comes back with the heart's action much accelerated, its beats being over 120 in the minute. In a minute or two, however, they begin to subside, and then I have constantly found that the double rhythm shows itself, and lasts for a variable time, at the end of which it is followed by the natural rhythm of the heart, then beating at the rate of about 65 to 70 in the minute.

A careful study of the auscultatory signs presented by the patient has led me to the following conclusions:

1st. As to the sounds when the heart is beating regularly. It is under these circustances that the churning direct mitral murmur is evident. This murmur, however, varies a gool deal in its precise relations to the first sound. Sometimes it is distinctly presystolic, running close up to the following first sound. At other times (I think more frequently) it is separated from this sound by a distinct interval—an interval which is quite as long as that which divides it from the previous first sound. The murmur is then, of course, strictly diastolic in rhythm, and can be taken with either of the two sounds between which it lies. Lastly, I have sometimes found that the murmur has appeared to follow one first sound more closely than the next first sound followed it. This, however, would only be the case for a few beats at a time, and, I think, chiefly when the heart's rhythm was undergoing one of its changes.

Now, if the stethoscope be first placed over the base of the heart, and gradually carried downwards, the following points are observed:—At the base itself the heart-sounds appear to be absolutely normal. A little lower down the second sound seems

to be double, Still lower, the double sound becomes murmurous; and this gradually passes into the prolonged murmur, above described as occurring at the apex. These facts are indicated in the following diagrams.

Pulse 64.
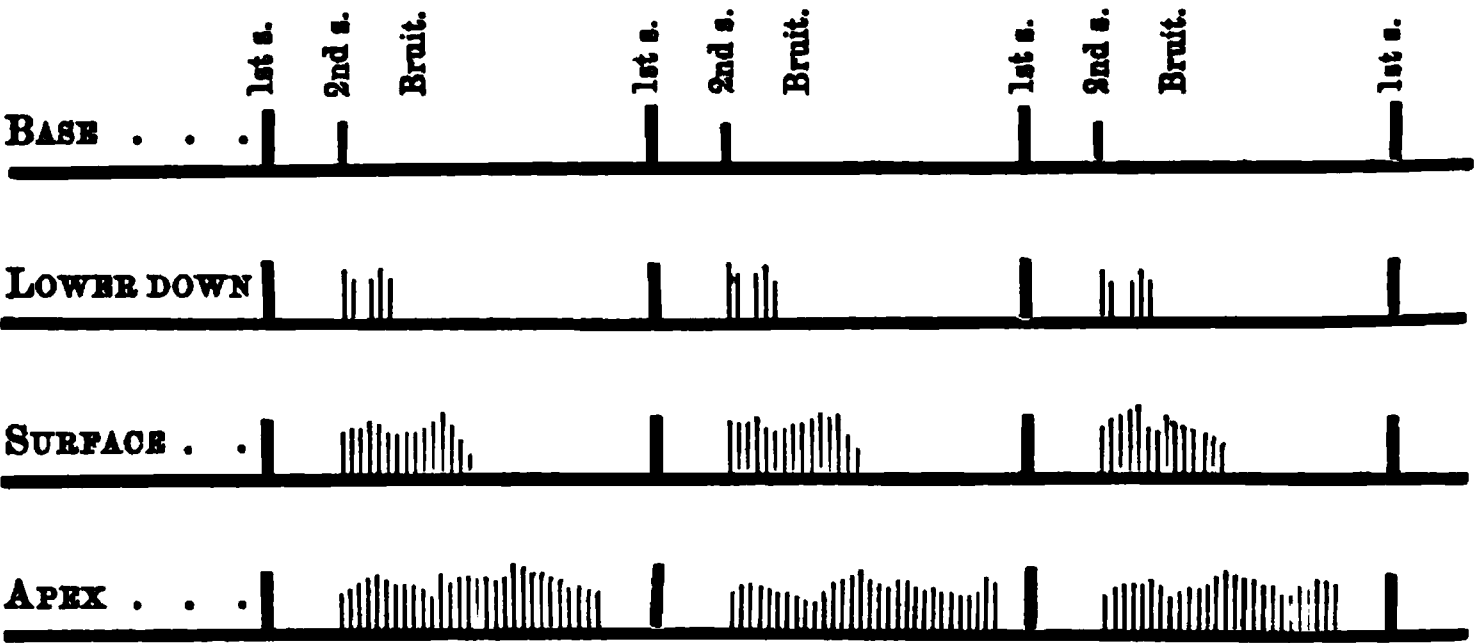
2nd. When the peculiar double rhythm exists the stethoscopic signs are much less easy of determination. This rhythm itself has lately been so transitory, that it has been difficult to decide on the precise character of the sounds.

The point which I have most clearly made out is that, on listening at the apex, when the double rhythm is present, the *last* sound is a prolonged *direct mitral murmur.* I believe that I have established the nature of this murmur, not only by its churning quality, but also by the fact that when the heart reverts to its normal rhythm transitions between it and the presystolic murmur are plainly made out. It would thus seem that each movement of the heart *ends* with a powerful contraction of the auricles; and this affords an explanation of the apparently venous pulsation which (as I have stated above) has been repeatedly observed in the root of the neck at this precise period.

The following diagrams represent the auscultatory sounds at the base and at the apex respectively, as nearly as I have been able to determine them.

Pulse 46.
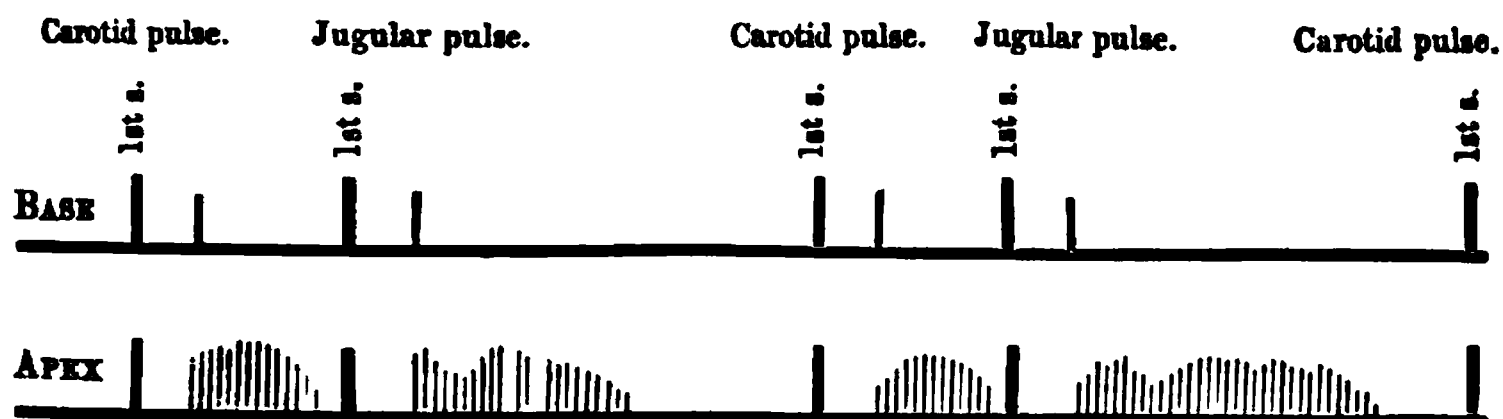
At the base the sounds are very much like those which would accompany two heart's beats following one another rapidly. Four sounds are heard, none of them attended with any very definite murmurs. At the apex two sharp "first sounds" are heard, with a short direct mitral murmur between them; and after the second "first sound" the prolonged murmur above described.

The figures which follow are copies of sphygmographic tracings, which were taken from this patient at different times by Mr. F. A. Mahomed. In fig. 3 the peculiar double rhythm is shown, just as it was commencing to manifest itself, after the patient had walked some little distance, as described on p. 833. The following description of the tracings has been kindly furnished to me by Mr. Mahomed.

Fig. 1.
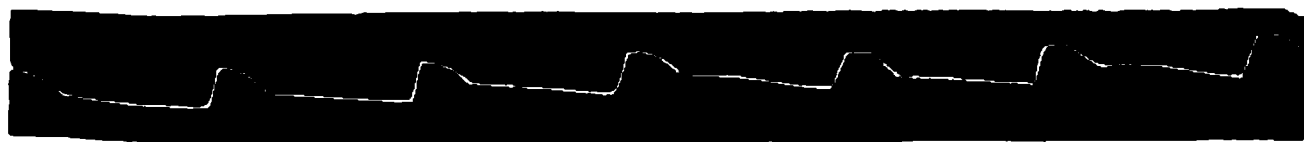
"Fig. 1 represents the tracing obtained of the patient's pulse while at rest, in bed, where she had been for some weeks. A pressure of 8 oz. was necessary to obtain this maximum wave. The small quantity of blood pumped into the aorta at each systole is indicated by the shortness of the upstroke, and of the systolic expansion. So small was the pulse-wave that it did not distend the walls of the vessels sufficiently to show their characteristic vibrations. In some tracings taken subsequently, when the patient was up and about the ward, the pulse-wave was fuller and quicker, and the pulse-curve (*i. e.* the line connecting the lowest points of the upstrokes, *ligne d'ensemble* of Marey) varied with each act of respiration. Both of these forms are described by Marey in mitral constriction.

Fig. 2.

" Fig. 2 exhibits the effect of digitalis. The heart, acting slowly and deliberately, causes a full wave of blood to be thrown into the aorta; whilst after the aortic notch, or closure of the aortic valves, that is, during diastole, the ventricle is stimulated by a fresh supply of blood from the auricle to a secondary contraction. This secondary contraction occuring during diastole, and found when mitral constriction is present, must be distinguished from another form of secondary contraction of the ventricle, which I have found coincident with constriction of the aortic orifice, and taking place during the systolic period.

Fig. 3.

" Fig. 3 shows the effect of exercise and its attendant dyspnœa on the action of the heart. The undulations present in the two larger waves may be explained as follows:—The first or main upstroke is, of course, due to the 'percussion impulse' of the blood. The succeeding short and rapid collapse, giving the needle-like summit to the wave, I ascribe to the first *percussion* impulse exceeding in power the succeeding portion of the cardiac contraction, the arterial coats contracting immediately upon it, till checked by the wave produced by the cardiac contraction alone, which causes the succeeding expansion. The next elevation is the ' diastolic expansion ' (Sanderson), which is preceded by the aortic notch. Finally, during the line of the diastolic collapse is seen an abrupt, short ascent, followed immediately by a continuation of the collapse, due to the secondary ventricular contraction. Under the influence of the increased flow of blood to the heart, produced by exercise, the pulse gradually increases in fulness till it reaches the maximum shown by the two largest waves, when, owing to the inability of the auricle to empty itself of its increased supply of blood by an ordinary contraction, a secondary contraction ensues, which is communicated to the ventricle and appears in the pulse-wave, corresponding to that seen in fig. 3."

It is, I think, impossible not to be struck with the similarity between the diagram of the sounds heard at the apex in this case, and that of the basic sounds in the case of H. H. (Case 67). The only way of explaining the auscultatory signs in either

patient appears to be by attributing the final bruit to a prolonged auricular systole. In the one case this seems to follow directly on the second sound, in the other to be separated from it by a slight repetition of the ventricular systole, not full enough, for the most part, to produce an arterial pulse.

I am well aware that many observers will doubt the possibility of the heart's beat being thus terminated, before the pause, by an auricular systole. It seems to me, however, that no other hypothesis will explain the facts, and that this hypothesis is, moreover, strictly accordant with the results of observation in cases of unquestioned mitral contraction with direct murmur. I have already quoted (p. 262) Friedreich's description of the presystolic murmur as being often distinctly developed out of an apparently reduplicated second sound. And under Case 4 will be found a note of my having independently observed this very fact. 1 do not see how we can possibly explain it, unless we suppose that the apparent second half of the sound is due to a very early auricular systole.[1]

If the correctness of this view be admitted, it will of course decide the question discussed by Dr. Hyde Salter in his lecture already quoted,[2] as to whether the whole of a long presystolic murmur is due to the systole of the auricle, or whether the passive flow of blood through the mitral orifice can of itself cause a murmur. In considering this question, we must, I think, bear in mind that the anticipation of the auricular systole may perhaps be apparent rather than real. It is admitted that the ventricular systole does not occur until the ventricle has been filled by the contraction of the auricle. Hence, if the mitral orifice be narrowed, the auricular contraction would take longer than natural, and the beat of the ventricle would by so much be delayed; but, since it is necessary that the circulation should proceed at a certain rate, all the following movements would be proportionately accelerated. In this way it may, I think, be argued that the necessary effect of a progressive narrowing of the mitral orifice must be to separate the auricular systole more and more from the following ventricular systole, and to bring it closer and closer to the preceding second sound.

[1] See the footnote to p. 339.
[2] In his paper in an earlier part of the present volume, Dr. Wilks refers more than once to this question as still debateable.

It may indeed be argued, in opposition to this view, that the auricle undergoes a compensatory hypertrophy, which may prevent its systole becoming prolonged in the way I have suggested. But, in the first place, there is nothing to show that the compensation is so perfect as to enable the auricle to effect the whole of its work within the brief space of time allowed for its normal contraction. And, in the second place, it is obvious that the amount of blood which flows passively into the ventricle during the pause must be very greatly diminished by narrowing of the mitral orifice; and that the quantity requiring to be *forced* through that orifice by the auricular systole must be proportionately increased.

The considerations urged in the two previous paragraphs appear to me to prove that mitral contraction, when present in any marked degree, must necessarily alter the conditions under which the auricle works, much more than has hitherto been supposed.

The hypothesis that the case of H. H. (Case 67) is essentially one of mitral contraction is further supported by the fact that the bruit in her case is very similar to one which Duroziez has described as pathognomonic of that lesion. And Duroziez's views appear to have been themselves based upon certain observations of M. Bouillaud, and to those, therefore, I must first refer.

As far back as the year 1835 M. Bouillaud[1] described a peculiar triple or quadruple bruit, taking the place of the two sounds of the heart, in cases which (he says) up to that time no observer had distinguished. He gave four instances of this bruit. Case 1 was that of a woman in whom four successive sounds and as many movements marked each revolution or complete beat of the heart. The first of these was formed in part of the normal first sound (claquement) and in part of a slight *souffle;* next there were two sounds, following each other rapidly, and accompanied by a dry cracking (*craquement sec*); lastly came a very pure *souffle.* In Case 2 a triple bruit was heard. This resembled very closely the beat of the drum known as the *rappel,* or, to use another simile, the sound produced by a hammer

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[1] 'Traité Clinique des Maladies du Cœur,' première édition, tome i, p. 131. In the second edition (1841) the paragraphs in question are copied without alteration. I therefore quote from it, p. 213.

falling on an anvil after striking the iron, rebounding, and falling to rest. It might be indicated by the sounds Tic . . . . tac . . . . . tac . — Tic . . . . tac . . . . . tac. The first of these sounds was accompanied by a slight *souffle ;* the two others occurred close together, and seemed due to a decomposition of the natural second sound into two parts . . . . . A week or two later this patient also had a quadruple bruit; the last portion was then a *" bruit de souffle d'aspiration."* The heart's rhythm might then be indicated as follows: Ticsss . . . . . tac—tac . . . . sssssss. — Ticsss . . . . . tac—tac . . . . sssssss. Case 3 presented the triple bruit, or "bruit de rappel." In this instance also the pulse was double. In Case 4 a similar bruit was heard. These are the only examples given in the first edition of M. Bouillaud's work; but before the second edition appeared, six years later, he had met with more than twenty additional cases. In every instance the patient was affected with contraction of one of the orifices of the heart, attended with induration of the valves, and generally accompanied by the results of pericarditis. Case 1, however, is the only one in which the post-mortem appearances are precisely detailed, viz., considerable narrowing of the mitral orifice, with fibro-cartilaginous induration of its valve ; tendinous thickening of the aortic valves at their adherent border; fibro-cartilaginous patches in, and some adhesions of, the pericardium. M. Bouillaud's explanation of the triple bruit is of course not very satisfactory, for he held that the cause of the second sound was the dilatation of the ventricle, and thus he supposed its reduplication to be due to the ventricle filling itself by a double movement.

In 1854, M. Lemaire published[1] an account of some cases which had occurred in M. Bouillaud's clinique. I may quote as an example his first case. In this there was a diastolic *frémissement vibratoire ;* the second sound at the base was reduplicated ("bruit de rappel "); at the apex a soft diastolic murmur was heard, occupying the whole of the heart's pause ; this was inaudible at the base. The diagnosis was that the mitral valve was contracted; and after death only the end of

[1] "Quatre cas de souffle au second temps à la pointe du cœur, coincidant avec un triple bruit," 'Union Méd.,' Avril, 1854.

the little finger could be passed through its orifice.   M. Lemaire further quotes a paper on the triple bruit (bruit de rappel), which he had published in the 'Union Médicale' for 1849. There had then occurred only seven cases in which post-mortem examinations had been made.   In every instance the mitral orifice was found to be contracted.

With the exception of M. Lemaire, I am not aware that any later writer has paid much attention to the *bruit de rappel*.[1]

Some years later, however, M. Duroziez drew attention to "a peculiar rhythm, which from its frequency may be called the

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[1] Hamernjk, of Prague, in a paper on the Mechanism of the Cardiac Valves ('Prag. Vjhrsschrft,' 1847, xvi, p. 170) speaks of a double or triple tone as being not uncommonly heard with the diastole above the left ventricle.   "This double or triple tone," he goes on to say, "is not carried at all (or only slightly) along the arteries; it is occasionally converted into a more or less continuous spinning-wheel murmur (Spinnradgeräusch).   It is due either to insufficiency of the aortic valves, or more commonly to roughening and stenosis of the mitral orifice.   According to Skoda, it represents the portions of greatest intensity of a murmur, of which the intermediate portions, so to speak, are inaudible."   It appears to me that in this passage Hamernjk very probably had Bouillaud's statements in his mind, although he makes no reference to them.   The explanation which he attributes to Skoda seems to me much more probable than the view held by Walshe, Geigel, and others, that the reduplicated sound is due to the closure of the valves or their segments not being simultaneous.

In a more recent communication Drasche ("Ueber Verdoppelung und Spaltung der Herztöne," 'Wien. Med. Woch.,' 1855, Nr. xxx, pp. 468, 486) has said that the diagnostic value of a reduplicated second sound over the left ventricle is the same as that of a murmur; it being in fact an *interrupted murmur*.   Moreover, it may be converted into a prolonged murmur, if the patient be made to exert himself; this may sometimes be brought about even by telling him, when re-cumbent, to raise himself two or three times into the sitting posture.   I have already quoted Friedreich's statements to the same effect (p. 262).

Since this paper was written, I have discovered that Dr. Paul Guttmann, of Berlin, has expressed a still more pronounced opinion as to the origin of the reduplicated second sound in cases of mitral stenosis (' Virchow's Archiv,' 1869, xlvi, p. 109).   He describes reduplication of the second sound as not very commonly present, and as existing chiefly in those cases in which the contraction is not extreme.   He believes that both parts of the sound are produced at the mitral orifice, and that the reduplication is due to the contraction of the auricle taking place interruptedly (absatzweise).   He shows that the view of Geigel and others is untenable, that it results from a want of simultaneity in the closure of the aortic and pulmonary valves respectively.   He also lays especial stress on the conversion of the reduplicated second sound into a presystolic murmur.

rhythm of mitral contraction, and which may be represented thus : ffout-ta-ta-roū,—this last sound, of snoring quality (ronflement), being connected with the first blowing murmur (souffle), so as to produce a continuous bruit.[1] This peculiar rhythm is perceived at the apex; over the aortic valves the sounds are quite different, being represented by vout-ta-ta."

Duroziez gives the following explanation of the peculiar sounds just referred to. The first souffle, "*ffout,*" he ascribes in part of the auricular, in part to the ventricular systole. The next element, the "*ta-ta,*" is a reduplication of the second sound, and is caused by the aortic and pulmonary valves not closing quite simultaneously. The first souffle may be wanting, but Duroziez appears to think that the peculiar "*ronflement*" or "*gronde-ment*" might be heard in every case, if examined with sufficient care and while the patient is under the influence of digitalis.

It is in this paper of M. Duroziez that the paragraph occurs, which has already been quoted, concerning the presystolic bruit (*vide* p. 259). He thinks that his "*grondement*" has been taken for this bruit. In conclusion he gives short notes of some nine cases, in which the mitral orifice was found contracted after death, and in many of which the peculiar rhythm described by him had been heard during life. In some of them the tricuspid valve was narrowed, as well as the mitral. As bearing upon my own cases, it may be interesting to note that Duroziez expressly states that in one case, while digitalis was being given, " the pulse generally became slower, and *became double,* each strong pulsation being followed " by a feeble one."

No one, I think, could read the descriptions by Bouillaud of the " bruit de rappel," and by Duroziez of the " bruit ffout-ta-ta-roū," without admitting that they may fairly be applied to the case of H. H—, above related (Case 67); and when the resemblance which exists in certain respects between the aus-cultatory signs in H. H— and those in E. B— is also borne in mind, it will, I think, be allowed that a strong case is made for the belief that the disease in each instance is mainly a contrac-tion of the mitral orifice. I am quite alive to the danger of expressing a positive opinion as to the cause of so rare a bruit, at a time when no opportunity for verifying that diagnosis

[1] " Essai sur les Maladies du Cœur. Du Rhythme pathognomonique du rétré-cissement mitral." ' Archives Générales,' sér. v, vol. xx, 1862, p. 885.

appears likely soon to present itself; but it seems to me so desirable to draw the attention of other observers to the subject, that I should have thought myself justified in placing the cases on record, even had I been unable to advance any hypothesis as to their nature.

In conclusion, I cannot refrain from pointing out how important a bearing the facts detailed in this paper seem to have on that physiological theory which ascribes the first sound entirely to the tension of the auriculo-ventricular valves, and which, from its simplicity, appears at first sight so attractive. On the one hand, we find that in cases of extreme mitral contraction, in which the valve is thick, hard, and almost immovable, the first sound is peculiarly short, sharp, and clear. On the other hand, we observe that the auricular systole, at a time when no valve whatever is being stretched, is capable of giving rise to a sound scarcely differing at all from the natural first sound (see Case 2, p. 273). Are not these facts almost conclusive in favour of the view that the tension of the ventricular wall is at least as much concerned as the tension of the valve in the formation of the first sound?

CASES OF

PUERPERAL CONVULSIONS TREATED WITHOUT BLEEDING.

By J. J. PHILLIPS, M.D.

THE following cases of puerperal convulsions (most of which occurred in the Guy's Lying-in Charity), although few in number, appear to me to possess some interest, as illustrating the results chiefly of one general plan of treatment. In no case was any blood withdrawn, while in nearly all chloroform was given.

So much difference of opinion has, for many years, existed in the profession as to the best means of meeting this serious complication of the puerperal state, that it seems desirable to possess additional facts in reference to its therapeutics. This is the more necessary as the methods of treatment employed can hardly be said to be otherwise than empirical.

The evidence afforded by recent statistical tables points to a wonderful reduction in the death-rate of patients affected with puerperal eclampsia as compared with the mortality in former times. Thus, while La Chapelle stated that with the best directed treatment not more than half were saved, a conclusion with which Becquerel agreed, and Cazeaux and Velpeau considered that one patient out of every three died, we find that Chailly-Honoré (1859) saved eighteen out of the nineteen cases which he treated with chloroform, and Professor Braun, of Vienna, did not meet with a single death in sixteen cases treated by the same means.

It may be stated that venesection is the remedy which formerly found most favour, and even at the present time it is probably much more frequently employed, in England at least, than any other method of treatment. This practice was strongly urged by most writers in the early part of the present century. Thus Denman recommended it in all cases where convulsions existed or were to be apprehended; but the basis of his recommendation would hardly be accepted as sound in the present day. He says, " Bleeding is known to lessen in a very effectual manner all the complaints in pregnancy which arise from uterine irritation, and to a certain degree in pregnant women from most other causes." Dewees considered bleeding in puerperal eclampsia as " our sheet-anchor," though he relates a case in which he bled his patient to a hundred and twenty ounces in the first six or seven hours, and took away twenty ounces more afterwards, without producing any appreciable effect on the progress of the convulsions.

Others of the earlier writers, however, recognised the fact that eclampsia may arise from anæmia, and Leake (1774) says that " convulsions from inanition are much more dangerous than those from plethora, as it is easier to empty than replenish the vessels."

We find that the practice of free bloodletting afterwards received an additional impetus from the teaching of Broussais, who considered that the convulsions were the immediate consequence of a cerebro-spinal congestion of an active kind, and even of a sanguineous effusion in the arachnoid or in the cerebral substance.

The more modern obstetrical authors, with few exceptions, consider venesection the most efficacious remedy, though nearly all agree in recommending its performance in moderation and with a due regard to the patient's general condition.

The discovery that, in the great majority of cases, albuminuria coexisted with the eclampsia of puerperal women probably tended to moderate the extent of bloodletting; and Professor Braun, who considers puerperal convulsions as being, with scarcely any exceptions, of an uræmic character, would dispense with venesection altogether. So experienced a physician as M. Depaul, however, thinks that the pallor, the partial or general anasarca, and the existence of albumen in

the urine, ought not to prevent our having recourse to free bleeding.[1]

Dr. Hodges, the author of one of the latest English books on puerperal convulsions,[2] says " there can be no question that the judicious use of bloodletting is the most valuable remedy known for puerperal convulsions, and that to omit its employment in the generality of cases that occur is to hazard, or perhaps destroy, the lives of those unfortunately afflicted with this fearful disease."

Denman says that in his time it was presumed that the pressure made by the expanded uterus upon the descending blood-vessels, causing a regurgitation of the blood to the superior parts of the body, to the head in particular, by overloading the vessels of the brain, produced convulsions. Some of the latest writers on puerperal eclampsia also believe that an active congestion of the brain and spinal marrow is not an uncommon cause of the convulsions. This differs so much from the present ordinarily accepted theory of epileptiform seizures, that unless supported by observation it can hardly be accepted as correct.

The so-called congestion of the brain, which has been found in some cases of puerperal convulsions on post-mortem examination, is much more probably the result rather than the cause of the affection; while it is well known that such a condition after death is frequently due only to a dependent position of the body. It is particularly worthy of notice how very few are the recorded instances in which any decided cerebral lesion, in the form either of congestion or of sanguineous effusion, has been noticed after death from puerperal eclampsia; and it appears very doubtful whether cerebral hæmorrhage ever occurs, even as the result of the convulsions, in patients whose blood-vessels are healthy. Indeed, in many cases it is distinctly stated that there was a considerable quantity of serum on the surface of the brain, and this, so far from indicating any inflammatory condition, is evidence rather in favour of a

[1] Quoted by M. Maugenest, 1867, " Étude Critique sur la Nature et le Traitement de l'Éclampsie Puerpérale."

[2] 'On the Nature, Pathology, and Treatment of Puerperal Convulsions,' by R. Hodges, M.D., London, 1864.

passive change accompanying a wasted brain, or secondary to Bright's disease.

It is true that the symptoms which indicate cerebral hyperæmia are well shown in the stupor which succeeds severe and repeated puerperal convulsions, and are probably due to the congestion resulting from the violence of the spasm; but the convulsions are primary, while the turgidity of the face, the injection of the conjunctiva, the fulness of the jugular veins, the stertorous respiration and the coma are secondary.

Trousseau says, " During the tonic period of an epileptiform seizure, the glottis is closed, and the patient makes a supreme effort, during which the face, the vessels of the neck, and necessarily those the brain, get congested. The cerebral congestion may in such cases, then, be considered as secondary and passive. We cannot admit that the attack of eclampsia is the consequence of a primary congestion, when, on the one hand, we see that the severity of the fit is by no means proportionate to the degree of previous plethora, and that, on the other hand, epileptiform seizures which follow on a considerable loss of blood, are as severe as those noticed under perfectly different circumstances."

Dr. Hughlings Jackson also, in his excellent article on Convulsions in Reynolds' ' System of Medicine,' says, " We do not know what the intracranial changes are which cause fits, and we have no evidence that cerebral congestion occurs before the attacks. I may say that repeated convulsions are not the signs which should make us deplete."

Clinical observation on this point is abundantly confirmed by experimental research. The well-known experiments of Kussmaul and Tenner in reference to convulsions as the result of hæmorrhage and cerebral anæmia are decidedly at variance with any theory which offers, as the cause of an epileptic attack, sudden congestion, whether of an active, passive, or mixed character.

Further, Brown-Séquard and others state it as a fact, that at the onset of an epileptic fit, the great nervous centres and the medulla oblongata of an animal subjected to experiment became pale, instead of presenting signs of congestion. And Schröder van der Kolk, although he attributes so much importance to dilatation of the arterial capillaries of the medulla oblongata in old-standing cases of epilepsy, regards this condition as secondary.

It will only be necessary further to refer to the teaching of Dr. Radcliffe, Dr. Hughlings Jackson and others, that the mass of evidence goes to show that spasm is a sign of enfeeblement of nervous matter. In the words of Jackson, "All clinical evidence points to this one general conclusion that nerve tissue is enfeebled in convulsions. Whether it be itself primarily in fault, or whether it suffers from want of blood, is poisoned by bad blood, or torn by cerebral hæmorrhage, there can, I think, be little doubt that it is enfeebled." And again, " I have no faith whatever that convulsions depend on any increase of nutritive changes that we can arrest by taking blood out of the system."

The most plausible argument which has been adduced in favour of bleeding in puerperal convulsions appears to be that it acts beneficially by relieving the circulation, lessening secondary congestion, and thus preventing injury, especially to the brain and spinal cord. In severe and frequently repeated convulsions death may of course threaten at any time by asphyxia, and the pulmonary congestion may be beneficially lessened by a judicious bleeding. There appears to be, however, in the minds of many, a belief that venesection is in some way specially suitable for the convulsions of puerperal women; whereas the puerperal state itself furnishes a strong argument in favour either of its omission or of the use of the lancet with a sparing hand.

Moreover it appears to me that the necessity of the employment of bleeding for the object just mentioned will diminish greatly in proportion to the frequency of the administration of chloroform at an early period of the attack. We have in chloroform an agent capable at least of materially controlling the severity of the paroxysms. The experience of several British and continental physicians is strongly in its favour, and the following cases, so far as they go, tend to prove its efficacy.

It is to be remembered that long before the discovery of the intimate connection of puerperal eclampsia with albuminuria, the frequency of serous inflammation, especially of the peritoneum, in such cases had been very generally observed ; and at a time when venesection was considered necessary to control the progress of such inflammation, this formed an additional reason for its performance. But since the serous inflammation probably bears an intimate relation to the kidney affection, there

does not seem to be here any argument in favour of bloodletting; while the great liability to puerperal troubles of a toxæmic character after severe hæmorrhage during labour, indicates the danger of depletion, at least in many patients, at such a time.

Again, the greatest advocates of bleeding in uræmic coma acknowledge that the difficulty as to general bloodletting in pnerperal convulsions with coma is considerable; while the physiological changes which the blood undergoes during pregnancy contra-indicate its performance. Remembering, however, the benefit which is frequently derived from local abstraction of blood in cases of acute Bright's disease, a practice based on the anatomical connexion proved to exist between the visceral and parietal vessels over the kidney, and knowing, from post-mortem evidence and the microscopical examination of the urine, the nature of the renal affection most commonly found in puerperal eclampsia, it is worthy of attention whether the withdrawal of a small quantity of blood by cupping over the loins would not in some cases be beneficial. This is suggested by the fact that occasionally persistent kidney disease has had its origin during pregnancy.

It is not intended in these few remarks to enter into the pathology of puerperal convulsions, except in so far as it bears relation to the question of bloodletting. I may, however, mention that the urine was examined in each of the cases here recorded, and that the result was simply confirmatory of the observations of others as to the almost constant coexistence but temporary duration of albuminuria. In only one case was the albumen persistent. The urine which had been passed prior to the first fit was not obtained in any of the cases, but in one case the urine found in the bladder (which had not been emptied for some hours) after the occurrence of the first few convulsions was not albuminous, whereas that drawn off soon after the last paroxysm gave decided evidence of its presence. Extended observations as to the relation which the albuminuria and convulsions bear the one to the other seem very desirable towards the elucidation of the etiology of puerperal eclampsia.

It must be admitted that theoretic objections to a special method of treatment should in a great measure be disregarded if experience declares decidedly in its favour. The fallacies incident to conclusions deduced in such manner should, however,

be guarded against ; and in reference to the subject under consideration it should be remembered that puerperal convulsions, like other diseases, often subside spontaneously, and that the remedies employed may probably in many cases have but little to do with the disappearance of the symptoms.

It seems to me, however, impossible not to attribute, at least in a great degree, the diminished mortality from puerperal convulsions to the less frequent and the less free depletion which has been practised of late years, and proportionately to the more usual administration of chloroform in such cases. M. Maugenest, who has entered very fully into the subject, gives the mortality previous to the introduction of chloroform as 45 per cent. ; and, making due allowance for the fallacies of medical statistics, the difference is so striking, compared with the death-rate in the present day, and we know that the influence of the anæsthetic over the paroxysms is so marked, that evidence warrants, I think, its still more frequent administration. Cases, not a few in number, are recorded by Goss,[1] Sedgwick,[2] Maracio,[3] and others in which, after free bloodletting had been practised without any apparent benefit, the treatment by chloroform was successful ; and whatever may be said in favour of bleeding as a preventive of excessive cerebral congestion, it seems very doubtful whether it can lay claim to any power of arresting the convulsions, while if carried to a great extent it becomes a powerful excitant of the paroxysms, it predisposes to various puerperal ailments, and greatly retards convalescence.

While we cannot consider bleeding as a remedy for puerperal convulsions, neither can we claim for chloroform, in the majority of cases with which we meet, any direct curative power. The theory that its beneficial effects are due to the temporary diabetes which it produces, and to the influence of this state in rendering innocuous the retained urea, is at least very doubtful. Not only will the convulsions frequently recur at first if the chloroform be altogether discontinued, but a perusal of the following cases shows that sometimes a convulsion will occur while the patient is under the influence of the anæsthetic. Generally, however, whether the convulsions result from uterine

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[1] ' Bulletin Général de Thérapeutique,' Janvier, 1849.
[2] ' Med. Times,' 1849.
[3] ' Journal des Connaissances Médico-Chirurgicales,' 1854.

or vaginal irritation, or from the poisoned state of the blood, they are controlled by chloroform.

In thus either preventing the recurrence or in checking the violence of the paroxysms, chloroform is of great value in preventing or diminishing the secondary congestions and the exhaustion, which are universally admitted as the dangers to be apprehended from convulsions. In many cases also chloroform renders unnecessary any interference with the course of labour. With such an agent at command it seems to me doubtful whether it be advisable in the first stage of labour to resort to any mechanical means for dilating the neck of the womb; but if it be determined to accelerate labour at this stage, then chloroform renders harmless a proceeding which, notwithstanding its perfection as at present accomplished, could hardly fail to be accompanied by a temporary aggravation of the convulsions.

Moreover it is of great service in convulsions occurring during the second stage, when it is often expedient to deliver cautiously by instrumental aid. Thus to both the medical and the obstetrical treatment of these convulsions chloroform is equally applicable.

When the patient has already suffered from frequent convulsions before being brought under the influence of the anæsthetic, and great pulmonary congestion has resulted, as indicated by the continued lividity of the face and the quick respiration (a condition, however, in which the pulse may be frequent and irregular), the withdrawal of a few ounces of blood may probably be beneficial before administering chloroform. This, however, was not done in any of the cases here recorded.

The recommendation of Professor Braun should also be remembered, that if chloroform be not given in time to cut short a certain paroxysm, as much atmospheric air as possible should be allowed to enter the lungs during the convulsive attack and the coma immediately succeeding.

I know of no other precautions specially applicable; and I may say that I have never witnessed any untoward symptoms from chloroform in these cases, though I have had it administered in some instances continuously for several hours, and sometimes when the patient was already in a deep comatose condition between the attacks.

CASE 1.—A patient of the Guy's Charity, aged 24, who had

had two miscarriages, but no labour at term. At five a.m. on November 23rd, 1868, during the first stage of labour, she first complained of headache, and in twenty minutes' time she had a severe convulsion, which was repeated in half an hour. She was seen by me between six and seven o'clock, when a third violent paroxysm occurred. Body much distorted, face very livid, with foam at the mouth, teeth clenched. She was partly conscious between the attacks. The pulse was full and beat 112 per minute. A fourth fit of a severe strangling character soon happened, and lasted longer than either of the previous ones. There was no œdema. The bowels, it was stated, had not been relieved for two days. A drop of croton oil was given, and the patient placed under the influence of chloroform, and kept so until ten minutes past ten. Once or twice, when allowed partially to come to, twitchings of the facial muscles gave warning of a fit, but none occurred. At eight o'clock the os uteri was the size of a five shilling piece. At ten a.m. the uterus was acting well, and the head, evidently of a dead fœtus, was occupying the pelvic cavity. Labour progressed favorably, and the child was expelled at mid-day. The patient's urine was albuminous, but neither casts of tubes nor any blood could be detected. After delivery she was rather restless and wild in manner, and the pulse was 100 per minute. On the second day after labour the urine was free from albumen, and subsequently the patient's convalescence was uninterrupted.

Case 2.—A primipara, aged 21, was delivered naturally at seven p.m. on November 17th, 1868. There had been nothing unusual about the labour, but she was reported to have been in a very excitable state during its progress. At half-past eleven she complained of peculiar sensations in her head, and immediately was severely convulsed. Three convulsions occurred at intervals of about forty-five minutes, and then the fits were repeated every quarter of an hour. They consisted of clonic spasms all over the body, eyes directed to extreme right, teeth clenched, foam at the mouth. These convulsions lasted five minutes, and were succeeded by stertor lasting ten minutes. The face became very much congested. The obstetric resident, Mr. Cortis, gave her chloroform. The patient had been quite unconscious between the last fits, lying in a comatose state. Pupils

dilated. She was seen by me at half-past five on the morning of the 18th.

As there had been no paroxysm for some time the chloroform was discontinued, and it was noticed that the pulse was much smaller than when she was under the influence of the anæsthetic, 116 per minute. A severe convulsion soon occurred. Chloroform was again given, and although she was several times convulsed during the morning, the severity of the attacks was much diminished by it. She was kept fully under chloroform until ten a.m., except at half-past eight, when she was allowed to come to a little. She immediately went off into a very violent convulsion, and therefore it was administered up to ten o'clock. From ten to half-past one she was kept under its influence, being made quite insensible only when a fit was thought to be impending, the guides taken to indicate the necessity for complete anæsthesia being commencing stertor, twitching of the facial muscles, and a full and hard pulse, &c. It was not left off entirely during the intervals, because she became so very restless and violent when not under its influence. At half-past one the chloroform was discontinued, the patient lay quietly, and there were no more indications of a fit. Bowels freely open in the course of the morning. At three o'clock she complained of headache, and that her tongue was sore. A vapour bath was given in the evening. The patient was then quiet, very drowsy. Pulse 96. Respiration quiet.

Next day, Mr. Goodhart, Obstetric Resident, to whom I am indebted for notes of the case, reports that she had had a good night; had no pain anywhere; pulse 98, full. Patient quite sensible. From this time she progressed very favorably.

The urine drawn off at six o'clock a.m. on the 18th was of a dark straw colour, and became almost solid on the application of heat. Epithelial casts of tubes were seen under the microscope. A subsequent examination of the urine revealed also some casts of tubes, the contents of which were undergoing a fatty change, and this, with the subsequent history of the case, seems to indicate pre-existing kidney disease. The urine continued albuminous during the puerperal state, and also during her attendance among my out-patients, several months later. She had suffered from scarlatinal dropsy when young, but

during her pregnancy the lower extremities only had been œdematous.

CASE 3.—This was a very mild case. At two a.m. on October 27th, I saw the patient in labour with her fifth child. Small doses of opium had been given at frequent intervals, and some whiffs of chloroform, to facilitate dilatation of the os uteri. I was called in consequence of a convulsion lasting three or four minutes having occurred, the patient being quite insensible for ten minutes more. Finding the parts moist and dilatable, and the head presenting in the third position, I advised resort to forceps in the event of the recurrence of a convulsion. The pulse was full, 80 per minute. I was afterwards informed that the child was born naturally, in about an hour, the head having rotated into the second position, and that the urine passed next day was not albuminous.

CASE 4.—Sarah B—, æt. 25, was attended in her second confinement from the Guy's Charity, on September 22nd, 1870. Her first labour was premature, and the child still-born. Two years previously she had been severely frightened by her dress catching fire, and since then had been subject to epileptiform seizures and idiotic changes of humour, being one moment happy, the next miserable, without any apparent cause. She had a slight "show" at eight p.m. on the 20th of September, and was boisterously merry till half-past ten, when she suddenly had a severe fit, biting her tongue and becoming totally unconscious, with pupils fixed and dilated. The pulse was full and hard, 120 per minute. Mr. Bunny, the attendant, sent for the Obstetric Resident, who found her quite unconscious, hands clenched, respiration loud and stertorous, and lips livid. Pulse and eyes as above described. The os uteri was dilated to the size of a crown piece, the vertex presenting. On my arrival the patient, who had been in a semi-comatose condition, had another violent convulsion. Chloroform was administered, the pupils contracting when she was under its influence, and again dilating simultaneously with a clonic convulsion the moment it was interrupted. Mr. H. G. Turner and Mr. A. R. Manby took charge of the patient in turns, and kept her gently under the influence of chloroform till the following morning. At eleven

a.m., when I saw her, the chloroform was discontinued altogether, as the tendency to convulsions had ceased for some hours. The patient slept all through the day and the following night, and at half-past ten a.m., on the 22nd, she was very irritable, but no convulsion happened. The membranes were then ruptured, strong labour followed, and at half-past one she was delivered of a dead and decomposed fœtus. There was slight œdema of the legs, and a copious precipitate of albumen in the urine on the addition of nitric acid. This patient did perfectly well after her labour, the albumen having entirely disappeared from the urine on the 24th of September, four days after the convulsions.

Case 5.—Alice F—, æt. 14, a patient of the Guy's Charity, was attended on September 25th in her first confinement. She was a broad-shouldered, well-developed girl, who had been seduced by her cousin, and during the whole period of pregnancy had appeared to feel her situation deeply. At eight a.m., after a long labour, she was delivered of a fine female child. At three in the afternoon she was suddenly seized with a strong epileptiform convulsion. Mr. Manby, who has kindly furnished me with the particulars of the case, says that the primary tonic stage merged rapidly into an irregular clonic one, and passed off in a deep comatose sleep. At five o'clock another fit occurred: just previous to this she was irritable but conscious. When the fit came on Mr. Manby gave her chloroform at once, and sent for his colleague, Mr. H. G. Turner, the Senior Resident at the time. They found the uterus relaxed, and containing clots of blood. Its cavity was emptied, and a weak solution of the perchloride of iron injected. Beef tea and brandy were given by pouring them carefully down the inside of the cheeks. The pulse was weak and compressible, 120 per minute At seven o'clock she had another fit, which was cut short by chloroform, and again at eleven. Chloroform was given only at the onset of a fit, and two more occurred, when my opinion was sought. We determined to try the hydrate of chloral, forty-five grains of which, dissolved in water, were given at two a.m., soon after a convulsion. The patient slept after this in a restless way till half-past two, when twenty grains were given again. The pulse rose to 140, but became fuller and more dicrotous to the touch; respi-

ration 40 per minute; skin hot and dry. She slept placidly till five a.m., when she took another half-drachm of chloral and some beef tea and brandy. There were no more indications of any convulsions, and the patient from that time made a good recovery.

No albumen was found in the urine during the period of attendance upon her, but the child died on the second day after, having had " convulsions continually since its birth."

CASE 6.—On the morning of November 4th, 1869, I was called to Spitalfields to a primipara, aged 17, a patient of the Royal Maternity Charity. It was not known when the first fit occurred, but there had been at least about a dozen with very little intermission before my arrival. I found a short stout girl, perfectly unconscious, breathing rather stertorously, and with her conjunctivæ quite insensible. The os uteri was dilated to about the size of a shilling, the abdomen seemed very large, but there was very little liquor amnii. The lower extremities were œdematous, and the face was also puffy. The pulse, although not very full, was not compressible, and the skin was warm and moist. A severe epileptiform convulsion soon came on, the teeth being firmly clenched, the patient foaming at the mouth, and the face becoming very livid. I then placed her under the influence of chloroform, which controlled the convulsions, though they recurred in a slighter degree whenever the patient was allowed to recover from it. Cold was applied to the head, a drop of croton oil given, and also an injection, which produced free evacuation from the bowels. In my absence during a part of the morning chloroform was only given when indications of a fit came on, and, as usual, its influence was very marked in checking the severity of the fits, five of which happened in an hour and a half. On my return I again placed her under chloroform. Uterine dilatation proceeded favorably. Early in the afternoon I determined to deliver her slowly, and two living children were born, each with the aid of forceps. She had recovered from the effects of chloroform at the birth of the second child, and a convulsion came on. There was a little hæmorrhage, but the uterus soon acted well. There were no more fits during my stay, but her friends stated that some slight ones occurred later in the day. When seen by me in the evening

she was very restless, tossing herself about, but there was no appearance of a fit during the three quarters of an hour that I remained with her, and the convulsions did not recur after this. The urine drawn off at nine a.m. was clear, of a pale straw colour, depositing on standing a little whitish sediment. It contained albumen, about one fourth becoming solid with nitric acid, and some granular casts were visible under the microscope. This patient was drowsy and partly insensible for two days more, her pulse during that time being 120 per minute; but subsequently she made a rapid recovery, the albumen diminishing in quantity and disappearing. She has since been attended by the same midwife in a natural second labour. I found the urine quite normal at the fourth or fifth month of her second pregnancy. I should add that a dose of belladonna had been given by Dr. Gayton before I saw her, a prescription which I repeated in the evening.

CASE 7.—A patient of the Royal Maternity Charity, aged 19, was found in a fit on the 2nd of June, 1870, being then near the full term of gestation. After this she appeared well till two a.m. on the 7th of June, when another convulsion came on. Her friends having been told after the first fit that she would probably have more during labour did not send for the midwife till the patient had had eight or nine convulsions. I saw her at half-past nine a.m. She was then rather confused, but understood nearly all that was said to her. The pulse beat 92 per minute. The legs were œdematous, and had been so for three weeks; the os uteri was about the size of a florin, dilatable, and labour pains were regular. She had not been convulsed for an hour. The bowels had been much relaxed on the preceding day. I left her temporarily in charge of the midwife; two convulsions occurred, succeeded by temporary coma. At half-past twelve I found her in a most excitable state; and subsequently she had a very violent epileptiform convulsion, passing off with the usual coma. I determined to give her chloroform; and the os uteri being fully dilated, the head presenting at the brim, Mr. Murphy, then Obstetric Resident at Guy's, delivered her by turning the child, about half-past two, while I kept her fully under chloroform. No convulsion occurred, but she was allowed to recover from the chloroform after delivery, and had one fit in about an hour's time. In the evening she was

comfortable. Pulse 100. The urine found in the bladder in the morning was densely albuminous, becoming almost solid with nitric acid, sp. gr. 1018. It contained an abundance of epithelial casts and some blood-corpuscles. The patient appeared to be doing well for two days, though on the second day she was peculiar in manner; but on the third day I found her in a state of acute mania, shouting aloud for her friends to pray for her, a request to which they and the district visitor were attending. I gave her a dose of the hydrate of chloral at once, to be repeated every four hours in doses of about 25 grains. She was more quiet after the first dose, the second gave her two hours' sleep, the third four hours' sleep, and she was sleepy when seen by me the next morning. Quite rational, but still very ill, the pulse being 140; resp. 30; temp. 103°. She progressed favorably from this date. On the fifth day the urine had a specific gravity of 1019. It contained no trace of albumen, and on the ninth day, when last examined, it continued free from albumen. The mother and child did perfectly well.

Case 8.—Isabella C—, æt. 25, was attended in her first confinement by one of the pupils of the Lying-in Charity of Guy's, on the evening of August 17th, 1870. She was a well-nourished woman, though it appeared that she had been in bad circumstances previous to her labour.

The child's head presented, and the labour at first progressed satisfactorily. She, however, soon became very restless and almost unmanageable. A severe convulsion came on before the birth of the child, and others subsequent to delivery.

She was found by the Obstetric Residents kicking and struggling, and soon fell into a convulsion. Every muscle was tense, the pupils were dilated, she foamed at the mouth, the face was livid, the eyeballs prominent. This condition lasted about two minutes, and was succeeded by profound coma with stertorous breathing, lasting about five minutes; the struggling recurred as this passed off, and continued till another convulsion ensued. The convulsions recurred frequently, and a drachm of hydrate of chloral was given without producing any effect. Mr. Tuck and Mr. Turner determined to give her chloroform at half-past four a.m. The convulsions were then very strong and prolonged, and the struggling between the attacks was violent. I was sent for about

half-past five, and found her at six o'clock under the influence of chloroform, though not deeply so. The frequency and the violence of the attacks had been lessened by it. Her pulse, which had been full and hard, was then softer, but regular. The urine was loaded with albumen. A drop of croton oil was given, cold applied to the head, and we determined to persevere with the anæsthetic. From that time, though the fits recurred, they became less frequent, and their severity was mitigated by the chloroform, which was given freely when any warnings of a fit came on. There were two fits between nine and ten. The gentleman who attended her from ten to eleven suspended the chloroform for twenty minutes, but the recurrence of a convulsion compelled a resort to it again. She was kept gently under its influence till half past four in the afternoon; the last indication of a convulsion was about two o'clock. At nine p.m. she was lying in a comfortable sleep. Her convalescence was rapid and uninterrupted, and after the first few days she was able to suckle her child.

Three other cases have come under my care in the Guy's Charity during the last eighteen months. Two of these are omitted from this report because no special treatment was adopted, the labour being over, and the convulsions having ceased before I was called to them. The third is not reported in detail because probably no one would have considered bleeding suitable for such a case. The convulsive attacks, although frequent, were very slight, and were not succeeded by any coma or much lividity. They came on the third day after labour in a poor feeble girl, aged 19. On the following day the patient did not appear to suffer at all from the effects of the seizures, and she soon recovered her usual health.

These cases are, of course, far too few in number to warrant conclusions being drawn from them alone. Evidence is, however, accumulating in favour of chloroform; and I venture to submit the following propositions, which are, I think, supported by theoretical considerations and practical experience.

That bleeding has no claim to be regarded as a remedy for puerperal convulsions; and that in the majority of cases at least, if seen at an early period of the attack, it is unnecessary.

That bleeding is often injurious, by predisposing to various

puerperal ailments, by retarding convalescence, and sometimes by increasing the violence of the paroxysms. Also that the present diminished mortality is probably chiefly due to the less free depletion which is now practised.

That the chief reliance should be placed on chloroform, which prevents the recurrence, or diminishes the violence of the paroxysms.

That in mild cases it is sufficient to keep the patient very slightly under the influence of chloroform in the intervals, more being given when indications of a fit are seen; but that in severe cases the patient should be kept for a time uninterruptedly under its influence.

That if the convulsions have already produced much pulmonary congestion, it is beneficial to withdraw a few ounces of blood before administering chloroform; and that generally it is advisable to lessen the tendency to cerebral congestion by the application of cold to the head.

That it is rarely necessary to interfere with labour before the os uteri is dilated, or in those cases where the convulsions precede labour; but that it is usually expedient in the second stage to complete delivery, due regard being had to the condition of the uterus.

CLINICAL RECORDS.

By J. COOPER FORSTER.

It is my intention each year to give reports of the more important cases that have been admitted under my care, with a few observations upon each of them. I trust that those students who have been constantly attending my visits to the wards, and more particularly my dressers and reporters may thus have records of some of the principal surgical cases that have occurred during their pupilage. I hope that in after years these records may be of use to them, and will incite them to improve upon the treatment they have seen. The cases may be of use to them, especially when recalled to their minds by parallel ones which may occur in their practice. I propose to complete the year's records at the end of September; my account this year, only commencing at the end of July, will of necessity be short, but it contains a fair number of cases, and every one may be said to be imbued with a certain amount of interest. Records of cases to be of much value, I believe, must be taken under the supervision of the surgeon, who is answerable for their truthfulness, and must also superintend constantly, if he does not absolutely take the reports himself. The reports of the cases will be made as concise as possible and yet of sufficient length to be self-explanatory.

Case 1.—*Tumour in thigh.*

J. S—, æt. 44, admitted 6th August, 1870, into Luke Ward; of good general health; history of struma in family, but denies syphilis; there are scars about his body.

Rather more than three years ago had some affection of the

right testicle, from which he suffered for a year, at the end of which time the testicle was removed in St. Bartholomew's Hospital.

Two years ago had disease of left knee-joint, which got quite well after rest.

Twelve months ago first observed a small hard swelling on the outer aspect of the left thigh, at the junction of its middle and lower third, which swelling has gradually increased in size and become softer ever since. ·

Present condition.—In the above-mentioned situation there is a tumour four by four and a half inches in length and breadth, of somewhat irregular form, smooth surface, and painful when lying down, not when in the erect posture nor on manipulation. Distinct fluctuation ; no marked swellings of left leg nor signs of pressure on veins or enlarged glands in groin.

8th.—Tumour tapped, thin fluid escaped, not purulent.

9th.—Chloroform being given, an incision about five inches long was made, and a growth exposed which did not turn out readily. It was situated amongst the muscles, which were divided in its removal; not much hæmorrhage ; vessels twisted; edges of the wound were brought together by plaister; no sutures employed ; pressure was made by pads of lint.

11th.—Dressings were removed to-day, as there was a good deal of discharge ; centre of the wound open ; each end united.

The wound granulated.

September 1st.—The man got up for the first time : in consequence apparently, on the

5th.—Inflammatory swelling appeared in the groin, and in a few days suppuration took place ; this was followed by other abscesses which were opened.

October 10th.—The wound was healed in the thigh, but several openings still existed in the groin ; he was ordered Pot. Iod. gr. v in allspice water, and quinine in pills three times a day. He has since gone out well.

The tumour on examination appeared to be imperfectly organized fibrin, infiltrating the tissues and forming cavities containing clear yellow fluid ; no defined cyst-wall ; some muscle was removed, blended with the tumour. Microscope showed nuclei and delicate fibres. I believe this to have been a syphiloma; and I came to the conclusion after removal that it would have been better to have tried the effects in the hospital of large

doses of iodide of potassium, and the application of mercurial ointment before attempting removal. I might say, however, that both these remedies had been used to some extent before admission. The fact of the man denying the existence of syphilis could not be taken as of much value in a diagnostic point of view; the admission of his having suffered from that malady would scarcely perhaps have altered the treatment at the time. It would be interesting to know the condition of the testicle, and for what supposed disease it was removed. The length of time that had elapsed since its removal before admission into Guy's, and the absence of any enlargement of the glands in the lumbar region completely set aside the idea of there being any trace of cancer. The case was supposed to be of a cystic nature at the time of the operation, and so it proved; that is to say, there were several cavities containing clear yellow fluid. I conclude that the disease of the left knee-joint was probably also some mischief connected with syphilis.

CASE 2.—*Fistula opening externally.*

B. P—, æt. 55, admitted August 24th into Luke Ward; of good general health; works as a smith; no history of syphilis or phthisis. About two years ago an abscess appeared, without any cause that he is aware of, on the left side of the anus. This burst and discharged offensive pus; it has continued to run ever since; no pain; he has had piles, which have got well.

On examination a sinus was found, opening on the left side of the anus, extending upwards about two inches by the side of the rectum. The probe could not readily be passed into the bowel, though the end of it could be felt through the mucous membrane.

25th.—A probe director was passed without any difficulty and without pain apparently through an opening into the bowel, just within the sphincter, and the end was brought out through the anus; the probe was then freed with the knife, and the wound dressed with lint dipped in oil.

26th.—The lint was removed, and the patient ordered to keep the parts clean; a piece of lint was applied to sop up discharge. He was to remain in bed a few days.

September 3rd.—Wound granulating; no pain; discharged convalescent.

Case 3.—*Fistula opening internally.*

J. G—, æt. 28, admitted August 29th ; railway guard ; general health good; no syphilis; no phthisis. Was quite well up to three months ago, when he noticed a swelling which he could not account for near the anus. It was so painful he was obliged to leave off work. Six weeks ago it burst into the gut.

On examination an induration, which was very painful and tender, was found running forward for two inches from the anus along the right side of the raphé of the perineum. On examining the rectum with a speculum an opening was seen on its anterior wall about one inch from the anus,

30th.—An incision was made from the rectum into the hardened part, and the wound was dressed as in the former case.

September 8th.—Patient in a good deal of pain.

12th.—Upon examination to-day a sinus was discovered running forwards, which was laid open and dressed as before.

22nd.—Doing well; merely keeping the parts clean, and applying a little bit of rag for the sake of cleanliness.

30th.—Patient to get up.

October 12th.—Wound filling up ; patient very comfortable. Discharged convalescent.

The first of these cases was one of the most common form of fistula, with an opening externally, and one also within the gut. Though not always easily detected, there is scarcely any doubt to be entertained that upon careful examination an opening—it may be very small—is to be discovered in most cases of fistula of any standing ; it may be sometimes at a considerable distance up the gut, but most frequently just within the external sphincter; and there is no doubt, also, that the division of that muscle is all that is required for the perfect cure of the trouble. But no more than the division of the external sphincter is necessary, and this is most easily accomplished in the manner I have directed my dressers now for many years to adopt,—and in all my private cases I have used the same procedure. A grooved probe is passed along the sinus into the gut, and by passing the finger into the rectum the end of the probe by a little manipulation,

is pulled down out of the anus; a knife is then run along the groove in the probe, and thoroughly and perfectly divides the sphincter, and lays the sinus open. I feel satisfied that this is the easiest, simplest, and most efficient plan for dividing the sphincter ani externus, and it is only that muscle that need be divided. I should not dwell upon this excessively simple plan of performing this operation, did I not find the old orthodox recommendation of a blunt-pointed bistoury run along the sinus, the finger introduced into the rectum, and both withdrawn at once so as to divide the sphincter, still recommended in text-books of surgery, and diagrams showing the operation as thus performed still depicted in standard works. In the operation thus performed there is a chance of wounding the operator's finger, and there is a prospect of not thoroughly dividing the sphincter, both of which results are entirely set on one side by the operation I am in the habit of performing.

In the second case there was no opening externally, nor any internally; there was merely a large abscess in close proximity to the rectum, and which very shortly would have established a communication with the gut and the external parts. I therefore thought it advisable to adopt the plan I believe first recommended by the late Sir B. Brodie, and pass the knife, guided by the finger, into the rectum, cut outwards into the abscess through the sphincter at once, thus making one operation answer instead of two. This operation, however, unless performed with Brodie's knife, or unless in skilful hands, is not unlikely to be attended with failure, from want of thorough division of the sphincter. Brodie's knife, I may here observe, is one which is shaped like a bistoury; but the outside edge is sharp instead of the inside, thus facilitating the complete division of all the structures between the gut and the abscess. Of course a well skilled hand would easily do the same with a straight bistoury. To show that the failure is not a fanciful one, I may observe that in this second case the dresser failed, in the first instance, to divide the parts perfectly, and hence the necessity for the second operation.

In dressing these cases after the operation a piece of lint, placed in the wound directly after the division of the sphincter, and kept there until the bowels are open, is, I believe, all that is necessary. There is not the slightest necessity, so far as I

know, for what is called dressing the wound daily by stuffing a piece of lint to the bottom of it, so as to prevent adhesion of the edges. No such adhesion is at all likely to take place, and I do not believe it to be possible. I need hardly observe that cleanliness is a necessity where there is so large a discharging surface.

I have not adopted any other mode of procedure for many years than the one I here recommend for the after treatment of all cases of division of the sphincter. I doubt very much whether the horror with which the public mind is imbued in the matter of " cutting out a fistula" has not something to do with the protracted after attendance, and the unnecessary complication of the operation itself.

Case 4.—*Caries of spine.*

Ellen Dorman, æt. 23, residing in London, admitted into Charity Ward, August 10th, 1870.

Five years ago received a slight injury, from which she suffered no ill effects. Last Christmas she first noticed some stiffness and pain, attended by a swelling on either side of spine, between shoulder-blades. The swellings increased, and abscess formed, which was opened at the beginning of March, 1870, and has continued to discharge ever since. A month ago another abscess appeared by the side of the above-mentioned, which burst and discharged in like manner.

On August 8th she noticed some difficulty in passing water. Next day (9th) she went into the city, and, when she got home, sat down, and then found that she was unable to rise again. She became " paralysed, and could not walk or do anything." She has had no spasm or twitching of muscles.

On admission.—Is an anæmic, thin, unhealthy-looking girl. Has motor paralysis from umbilicus downwards. Has sensation paralysis on right side only of lower half of body, though there is some numbness of other side. Her urine has to be drawn off. Temperature of legs not sensibly lowered. No spinal curvature. Great tenderness over spine between angles of scapulæ, and in this situation are two sinuses discharging pus.

August 12th.—Progressive loss of sensation of left side of lower half of body. Fæces pass involuntarily. No twitchings nor convulsions of limbs.

13th.—Very low and weak when dresser saw her, almost comatose. Died in evening.

Post-mortem examination.—Necrosis and caries of bodies of fifth and sixth dorsal vertebræ. The pus secreted burrowed among the muscles of the back, forming abscesses communicating at one part with the sinus before mentioned. The last dorsal and first lumbar vertebræ were in a similar condition; but the collection of matter here was much more extensive, and affected the adjacent spinal meninges,—the arachnoid, for three inches above and below this spot, containing pus. This part of the cord was very soft, and of a creamy consistence, and microscopic examination showed broken-down multipolar cells. There was slight pleurisy, tubercle in lungs, kidney, and liver; and the bronchial, abdominal, and mesenteric glands contained a cheesy, scrofulous matter.

This was one of the most rapidly fatal cases caused by disease of the spine I ever saw. Paralysis, as a result of caries of the spine, when extending over a long period, is not uncommon; but for death to occur on the fourth day after the paralytic seizure is unusually rapid. The case is remarkable for the very extensive disease of the vertebræ which was seen on the post-mortem table, when it is remembered that she continued the ordinary occupation of a servant until the day before her seizure. The motor paralysis was remarkable as much more complete than the sensory, which latter was found only on the right side, whilst the motor was on both.

CASE 5.—*Stab in abdomen, wounding, and causing protrusion of intestines.*

George Meyers, æt. 56, admitted into Cornelius Ward on the night of August 27th, 1870.

About 9.30 p.m., August 27th, was stabbed in abdomen. The intestines immediately protruded, and he held them back with his hands as well as he could.

On admission.—Conscious, but pale, cold, and covered with a clammy sweat, and in a collapsed state. An inch and a half below and to left of umbilicus is a cleanly-made wound, through which about a foot and a half of small intestine protrudes, which intestine is distended outside, and constricted by the wound. In

this intestine, and passing right through a coil of it, in a direction transverse to its long axis, is a wound about an inch in extent, involving the mesentery, and bleeding profusely, and between its edges the bright red velvety mucous membrane protrudes. No extravasation of contents of bowel appears to have taken place.[1]

Soon after admission he was seen by Mr. Howse, who brought together the intestinal wounds by interrupted sutures. Interrupted sutures were also employed for external wound, and in these the peritoneum was included. Chloroform was not given. After the operation the man was ordered Liquor Opii Sedativ. ♏xx ex aquâ, 4tis horis.

August 28th.—Vomited several times during the night a watery, greenish fluid; has cold clammy sweats, and pain in abdomen increased by pressure; abdomen not distended; extremities not cold; pulse 126, small and thready; temperature 98.2; respiration 32.

29th. — Pulse of abdominal type, 124; respiration 46; temperature 99·8. Retched once in the night. At 4 a.m. passed a rather liquid motion; has an anxious expression of countenance; abdomen tympanitic, giving rise to colicky pains, which pressure does not aggravate much, unless made in neighbourhood of wound; tongue clean, but dry; is beginning to feel drowsy. 9.30 p.m.—Very weak. Nutrient enema given. Abdomen distended and tender. Evening temperature 100.

Post-mortem examination.—External wound in above-mentioned situation. Considerable amount of blood in peritoneal cavity, mixed with the lymph of an acute general peritonitis. The jejunum had been wounded about four inches from duodenum. The wound had been stitched, and had healed. There was a second wound some inches lower down, which had not been stitched, and was open. These wounds were opposite that in the abdominal wall.

There were two points of interest in this case well worthy of notice. The first was the fact of there being another wound in another bit of intestine unseen, and therefore not stitched up,

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[1] At twelve midday the man had one quarter pound of steak, three potatoes, and a cup of tea. He had nothing after this up to within an hour and a half of receiving the wound, when he had a pint and a half of porter.

small, it is true, but sufficient, it would have been thought, to have given rise to extravasation of the contents of the gut, which, however, had not taken place through it. The same immunity from the extravasation of any kind of food into the abdominal cavity must be noticed, and is, of course, to be attributed to the length of time that had elapsed (nine and a half hours) since the man had taken a heavy meal; indeed, in a younger person a more favorable prognosis might have been given owing to this fact.

CASE 6.—*Injury to abdomen.*

Elizabeth Barrett, æt. 9, admitted August 25th, 1870. About 3 p.m. on August 25th, was knocked down, and the wheels of a van passed over her pelvis. On admission was conscious, but pale and cold. She had vomited several times. There was a graze on her loins, and she complained of pain over the region of her bladder; bowels were opened soon after admission, healthy; no paralysis of bladder *noticed.*

Respiration 42; temperature 100; pulse 135.

August 26th.—Child still collapsed; surface cool; face pale; tongue dry and white. She now passed her water under her, and when a catheter was passed the bladder was found empty; complained of pain in lower part of abdomen. Had one bruise over lumbar vertebræ and upper part of sacrum, and another on lower part of abdomen; it hurt her to move, and she frequently vomited a clear liquid. No hiccough nor distension of abdomen (nurse says child got out of bed in night). She was ordered milk diet and warm opiate fomentations to abdomen. Respiration 36; temperature 98; pulse 128.

27th.—Collapse nearly gone off; is much better. Temperature 97·8; pulse 124.

28th.—Lost all tenderness on pressure; passed a natural motion; urine can be passed properly; pulse 106; temperature 98·4.

29th.—Pulse 96. Child seemed quite well, and, as no bad symptoms showed themselves, on September 21st she was discharged.

The diagnosis of this case was extremely difficult, and I was asked by those around me on the occasion of my two visits, for

I happened to be in the hospital on the admission of the case, what probable lesion had occurred. I confessed at the time an utter inability, from the symptoms, to say what had taken place. That the child appeared as if about to die on the 25th and 26th, no one who saw her could doubt; but whether her extreme collapse was owing to an inability to rally on account of her previous state of general exhaustion, was a matter of conjecture. The child was spare, and looked half starved; it is possible that may have delayed reaction, as occurred in a case of laceration of the parietal layer of peritoneum, an accident which would give rise possibly to some of the symptoms under which this child laboured. The rapid recovery plainly showed there was no serious lesion, and that was the diagnosis at the time of admission and following day, but it was also conjectured that shock might cause death in so young a child without an absolute rupture of any viscus.

CASE 7.—*Rodent ulcer of cheek.* (*Hereditary syphilis.*)

Sarah Kelly, æt. 23, a straw-bonnet maker, admitted into Charity Ward, September 7th, 1870.

Had always been quite healthy up to two years ago, when she was much troubled with abscesses about neck and body.

Four months ago a swelling came on her right cheek, which increased, softened, and burst. This was followed two months ago by an abscess at the back of her neck. Both these places have continued, in spite of treatment, to increase in size.

On admission, a large, deeply excavated ulcer, occupying greater part of cheek, extending from eye and cheek as far back as mastoid process, but lying below ear, and not involving it. There is some purulent discharge. At the back of her neck is a small ulcer of similar character. There is no induration of surrounding parts or glands. The face is very painful. She was ordered—

Pot. Iod., gr. v ;
Syr. Ferri Iod., ʒj ; ex aqua, ter. die.
Rum ʒiv; Milk, every morning.

A month afterwards marked improvement had taken place, the place on back of neck was well, and the surface of ulcer on cheek nearly level with surrounding parts. Six weeks after

admission it had nearly all skinned over. It was then discovered that there was a parotid fistula, the secretion from which was tested, and found nearly neutral. The opening of fistula was very minute. On November 15th she went out quite cured, except a small place round opening of fistula.

CASE 8.—*Ulcers, probably due to hereditary syphilis, and aggravated by bad and unwholesome food, &c.*

John McGarry, æt. 18, a cartridge maker, admitted into Luke Ward, August 30th, 1870.

Has never been healthy, and has previously suffered from the same sort of thing. Four months ago his present trouble appeared in the form of abscesses on both arms and left leg. When seen, the boy had unhealthy excavated ulcerations in these parts, which well matched with his half-starved, unhealthy appearance. He was ordered at first good, nourishing, and stimulating diet, and certainly got very much better; but when specific treatment was superadded the improvement was much more marked, and on October 28th he went out, much relieved.

These two cases are types of a class one frequently sees, and, I believe, are to be attributed to inherited syphilis. In neither case was there the slightest reason to suspect that the sores were the result of acquired syphilis. In the lad I tried the effects of good diet without specific treatment, and, though he gradually improved in health and the sores were inclined to heal, it was not until he took iodine that the most marked beneficial effect resulted. In the woman's case cod-liver oil, iron, quinine, and other medicines, had been tried before her admission into the hospital with no good effect, but immediately she got under the influence of even small doses of iodine a rapid change took place in the sores, and they quickly healed. I do not know of any disease, except syphilis, in which iodine produces so decided and marked an effect; and, illogical as at first sight it may appear, it does seem to me a fair argument that if a remedy exerts a most unmistakable good effect in a well-known class of cases, and if in others not so decidedly unmistakable the same good results accrue, we may legitimately come to the conclusion that the same poison is being combated

in the one case as in the other, and that the tolerance and good effect of a remedy may therefore be taken as an indication of its being required.

CASE 9.— *Wound of thigh.*

James Cox, æt. 12, residing at Plumstead, admitted into Cornelius Ward, September 22nd, 1870.

Was playing in a sandpit, when the side of the pit fell in on him, interring the lower half of his body and inflicting below-mentioned injury.

On admission.—At inside of top of right thigh and in the " crutch " is a clean incisiform wound, about three inches long. No important structures injured.

He was put to bed. The edges were brought together by sutures, and his legs tied together.

24th.—Stitches removed; no primary union.

October 5th.—Water-dressing used; wound healing nicely.

28th.—Wound healed; allowed to get up.

November 2nd.—Went out.

This was a remarkably curious accident. I can only explain it by supposing that the trousers, made tight by the act of falling, must have acted the part of a knife, and cut the thigh as described. There was no history of the boy's falling upon any sharp substance, and the mere stretching of the limb alone would certainly not be sufficient to rend the skin in the manner described. A somewhat similar case was mentioned as occurring at Bartholomew's Hospital at the same time that this lad was lying in Guy's.

CASE 10.—*Abscess of left thigh.*

William Horton, æt. 23, a printer, residing in Bermondsey, admitted into Luke Ward, September 7th, 1870.

Two months ago he sprained his left leg while working. He underwent vigorous treatment (blistering, &c.), and obtained temporary relief. The calf of his leg swelled, but this swelling subsided on his resting, and the present swelling appeared.

On admission.—Had a large abscess of outer and anterior part of the thigh, apparently beneath the deep fascia. This

was opened, and about three pints of pus were evacuated. The thigh was carefully strapped to keep the parts in apposition. The discharge was at times sanious, as from a breaking-down clot. A month after opening abscess, as discharge continued and no union had taken place, the strapping was removed from the thigh, and as the man refused to have it laid freely open he was told to get up, and in four days the surfaces seemed to have taken on healthy action and united, and in ten days the man left the hospital, nearly well with only a trace of opening, and hardly any discharge.

CASE 11.—*Abscess in right loin.*

Joseph Cooke, æt. 36, a labourer, admitted into Luke Ward, September 21st, 1870. Says that he, in July, 1868, had a fall, striking his right loin. He had pain in part, but no swelling, &c., and went on with his work as usual. A few days afterwards he passed urine of the colour of blood (not smoky and no clots in it) and his pain became worse. He could do no work, and in October, 1869, was under Dr. Rees, who relieved, but did not cure him. This condition of blood-coloured urine has been paroxysmal, lasting for about a week at a time. The last attack was in March, 1870. These attacks have always been attended with pain. In August, 1870, he first noticed a swelling in his right loin, which steadily increased in size.

On admission.—Is a spare and sallow man; complains of pain in right loin; there is a swelling about three inches in diameter in that region, the skin over which is red, and which evidently contains matter; the urine is normal. Ordered Mist. Quiniæ and poultices.

22nd.—Abscess opened and a quantity of fœtid pus discharged; a probe passed into opening goes in direction of ilium and sacrum; bone can be felt, but not dead or carious bone.

October 6th.—Abscess discharges and is filling up well.

12th.—Very little discharge; gets up and about; goes out to-day, but is to report himself.

In the former of these cases the good effect of rest could not be said to be well marked; on the contrary, the remaining in bed for a month seemed to have no result. The abscess dis-

charged as profusely as ever, the attempt to bring the walls of the sac together by pressure had failed, a probe could be passed the day I ordered him up in every direction, and the man was certainly becoming thinner and thinner. Under these circumstances he could scarcely be worse by getting up, and I supposed that a good effect might be produced upon his vital organs, which, coupled with the necessary action of the muscles of the thigh in the act of walking, might, the two combined, cause so complete a revulsion in the case as to attain one of two things— either union at once, as occurred, or inflammation of the walls of the abscess and a necessity for a long incision, that, by allowing the incised skin to fall back and the wound to gape, union of the two surfaces might occur; but the latter process of cure would of necessity take many weeks, and the former was the one hoped for and obtained.

The second case is of great interest, as showing the length of time that may elapse between the receipt of an injury and what appeared at the time the man was under my care, the sequel of the case. That the two had something to do with each other might fairly be doubted, and yet it is difficult to understand how a man should have gone on suffering more or less for over two years, and at the last an abscess develop itself, and the whole condition be relieved, without some connection between the two. I was at first inclined to believe there was some disease of the spine consequent upon the injury, and that the abscess was the result of periosteal mischief, but I could not at any time detect bare bone; at another time perinephritic abscess was supposed to be the disease, and it was exceedingly difficult not to make out a close connection between the passage of blood which occurred whilst the patient was under Dr. Rees's care and the subsequent formation of matter. That an abscess should occur in the cellular tissue externally, so long after the accident, was scarcely to be thought of, except to be rejected; there was not any marked clot of blood, such as one sees when the abscess is the direct result of a blow. I have not seen anything of the patient since, and therefore conclude he is well.

Case 12.—*Traumatic stricture of urethra.*

James Pafford, æt. 30, a mariner, residing at Anglesea, Hants, admitted into Luke Ward, August 3rd, 1870.

Three and a quarter years ago he fell (a height of six feet) from the paddle-box of a steamer, astraddle on the bows of a boat below, striking and injuring his perinæum, but making no external wound. On getting up he desired to make water, but passed nought but blood, and continued to do so for ten days, and since then, up to the present time, he has occasionally passed clots. At the time of the injury mercurial ointment was rubbed on the part, even to producing a salivating effect. Since the injury, has always had some difficulty in passing water, and the stream has slowly but surely become smaller and smaller. Any exposure to wet, cold, &c., makes matters worse. Has received some apparently ineffectual treatment.

On admission.—Passes urine in driblets; urethra very tender and water cuts him; has in the morning a slight muco-purulent discharge. The urethra can be felt thickened in perinæum, and is very sore and tender in that place. Urine appears healthy.

4th—I unsuccessfully tried to catheterize (Nos. 2 and 3). Urethra excessively sensitive; so he was ordered rest and Mist. Pot. Bicarb. ter. die ; Pil. Cal. c. Col. gr. x, h. s.s.

11th.—Urethra still irritable; a hot bath ordered, after which an attempt was made to pass a No. 1 catheter, but it failed ; no hæmorrhage.

16th.—Chloroform given, but a very small No. 1 silver catheter, tried by myself, could not be passed. The obstruction commences just behind bulb. Very little pain and no hæmorrhage followed the attempt.

Operation.—Chloroform given and a staff passed down to stricture. The stricture was then cut down upon and slit up throughout its extent, and then a catheter was passed through the wound into the bladder and fastened in. Some difficulty was experienced on account of the excessive narrowness of the urethra. The water that came through catheter was thick. No excessive hæmorrhage.

22nd.—Easy. Urine scalds wound, but is clear. Ordered Inf. Cascarillæ c. Sodâ ter die.

25th.—Catheter withdrawn from wound, and No. 10 passed, with some difficulty, per urethram.

September 1st.—Up to this time wound has been closing, and all urine has come through catheter. To-day dresser re-

moved catheter, and failed to pass another. With difficulty, I passed a No. 10.

7th.—Whilst at stool forgot to remove plug from catheter, so that urine burst through wound.

15th.—Up to this date a considerable quantity of urine has passed through wound since 7th. The catheter was removed and repassed with considerable difficulty.

24th.—All urine passed through catheter, and wound was filling rapidly up until last *night,* when some urine again passed through wound.

After this the catheter was occasionally changed, and the man went on well, being able to get up, until to October 11th, when catheter slipped out in *night,* and urine again burst through wound. The catheter was repassed, and the man again went on well, when the urine passed through wound in night for the third time. This has occurred once or twice since, and at the time of writing report, though patient gets up and about, yet he has to wear a catheter, as the wound is not quite healed.

This man is at present under treatment, and his case will be further reported in next year's account.

CASE 13.—*Traumatic stricture of urethra.*

Barnard Tyman, æt. 68, a New Zealand trader, admitted into Luke Ward, September 26th, 1870.

Health has been fairly good. He is hale, and hearty looking.

Thirty-seven years ago, when in Ceylon, was gored in perinæum by a buffalo. He was obliged to be carried home, and was unable to pass water. Was put into a hot bath and, after some trouble, a catheter was passed. Since that time exposure to cold or wet, excesses, &c., have created difficult micturition, to relieve which he has been catheterized about thirty different times, the operation being always followed by pain and hæmorrhage. The catheters used have generally been smaller than No. 5. On September 23rd, 1870, from fatigue and exposure to cold, he had difficulty in micturating ; by 25th urine only passed by driblets, and he went to a surgeon, who, having failed to pass a catheter, sent him to Guy's.

On admission.—Scrotum swollen, and thickening extending from its posterior part along course of urethra towards anus. Passes urine after much straining and by driblets.   Is in much pain.   Bladder not distended.   Catheter could not be passed by dresser, so he was put into a hot bath, after which he voided urine more freely.   The urine was very acid.

October 2nd.—Better; still passes urine frequently, and in small quantities; has a hot bath three times a week.   Ordered Pot. Carb. ʒj, Tr. Opii ♏xv, ex aquâ., ter die.

12th.—Much better.   Dresser passed No. 8 catheter easily, and left it in two hours; constriction is just behind scrotum.

November 8th.—Catheter has been passed several times; bladder rather irritable; sounded for stone, but none detected can pass urine in a small stream.

15th.—Urine passes in a small stream; has been taught to pass catheter himself, and told he must do it about once a week. Went out.

CASE 14.—*Stricture of urethra; urinary fistulæ.*

Thomas Bates, a labourer, a middle-aged man, residing at Greenwich, admitted into Luke Ward, September 21st, 1870.

Has had gonorrhœa several times.   Eight years ago he first experienced difficulty in passing water, but no catheter was passed, nor did he suffer from retention of urine, until February, 1869.   On the 8th of this month he was admitted under Mr. Birkett for retention, when, catheterism being impossible, the operation of puncture per rectum was performed.   The tube unfortunately slipped out, rendering a second tapping per rectum necessary on February 13th.   The tube was removed on 17th (not purposely, I suppose), and on 25th extravasation occurred, rendering perinæal section necessary on the 26th. On March 8th a No. 2 metallic catheter was passed, and on the 9th a No. 4; flexible catheters were passed up to No. 10, and on May 21st he left, there still being a small opening in perinæum.   After leaving he passed a catheter occasionally himself, but at Easter time, 1870, could not pass No. 3.   The wound in perinæum, which had never closed, became inflamed, and the surrounding parts swelled, and gradually attained their present unfavorable condition.

On admission.—Right side of scrotum and perinæum swollen. There are several sinuses discharging pus, and through these most of the urine passes, a small quantity passing per urethram. The parts are thickened and tender. A scar and a fistulous opening indicate the old wound.

Two unsuccessful attempts were made to pass a catheter.

27th.—I performed perinæal section, and passed a No. 10 catheter into bladder through wound. This was fastened in.

30th.—Some water passed through wound by side of catheter, which was removed, and a No. 9 passed per urethram. Bloody urine was passed for a few days afterwards.

October 7th.—Going on well; sinuses healing; all urine passes through catheter.

24th.—Catheter removed for first time; another passed.

After this he went on fairly; the sinuses healed, and occasionally some urine came through wound. On November 22nd some urine passed by side of catheter, which appeared to be blocked up, so it was removed, but dresser was unable to pass another. However, the man passed water well and in a good stream, very little coming through wound, and that only occasionally; so no catheter was passed. On November 30th he went out, there still being one slight opening (wound) in perinæum.

Case 15.—*Stricture of urethra.*

Christopher Lee, æt. 42, a carman, residing in Bermondsey, admitted into Luke Ward, September 21st, 1870.

His general health has been good. Five years ago he was operated on in Guy's for strangulated hernia.

Since childhood he has never passed water well, and six years ago the difficulty increased, but relief was obtained by taking medicine. Four years ago the difficulty recurred, and he came into Guy's, when a No. 2 catheter could not be passed. He was eventually relieved by medicine, warm baths, &c., while frequent attempts were made to pass catheters, but they always failed.

The difficulty in passing water has now come on again.

He says the stream has been gradually getting smaller for eight years.

On admission.—Urine passes in driblets, and there is a great deal of straining and difficulty. The dresser failed to pass a No. 3 catheter. Urine is albuminous.

26th.—I was unable to pass a No. 1 flexible catheter. Ordered him a hot bath daily.

30th.—Can pass water in a small stream.

October 3rd.—To have warm bath every other day; now passes a fair-sized stream.

4th.—No. 6 catheter passed by dresser.

5th.—No. 7 catheter passed by dresser.

8th.—No. 8 catheter passed by dresser.

12th.—Passes a good stream; bladder sounded, nothing found.

17th.—Passes good stream; no irritation of bladder or urethra. Went out.

CASE 16.—*Unreduced dislocation (four months' standing) of left radius and ulna backwards.*

Lucian Alston, an American, healthy, admitted into Luke Ward, August 25th, 1870.

Four months ago, in jumping out of a carriage, he injured his left arm. Three days after the accident he went to the Marine Hospital, Quebec, where the arm was put up in a *straight* (?) position.

The splint used was an angular one, the angle being alterable at will by means of a screw. The man, however, says that his arm was never bent more than at present by it.

(This is the man's own statement. After he had been in Guy's a short time he showed symptoms of decided eccentricity, if not of insanity.)

On admission.—Left arm useless; forearm at an angle of about 150° with arm; dislocation of radius and ulna backwards; motion in elbow joint almost nil.

On August 26th chloroform was given, and I forcibly bent the forearm to nearly a right angle with the arm. Something was heard to snap, which subsequently turned out to be the olecranon, which had fractured. The limb was put on an angular splint. The operation was succeeded by considerable pain and swelling of parts, which had quite subsided by

September 18th, when, in one of his eccentric fits, he left the hospital.

The question of how long a time should elapse after which no attempt should be made to put an otherwise useless limb into a condition better fitted for future usefulness, must ever be a matter in which no rules can be laid down; each case must be decided on its own merits. An active, energetic man will do more towards establishing a false joint in the new position the articular end of the bone has taken in a month, than a fat leuco-phlegmatic woman will in six, and hence the difficulty in laying down any rules for the guidance of students. That all limbs should be placed immediately after an accident in the position in which they will be most useful hereafter, is a proposition which I cannot imagine any one denying. The present comfort of the patient must certainly be considered, but undoubtedly not at the expense of the acquisition of a useless member, and yet, judging from many cases I have seen, it would seem to be the guide in the minds of some surgeons. In the present case I suspect there must have been some injury about the olecranon at the time of the accident, and hence the limb was put up straight, and not attempted to be bent until too late (supposing the man to be believed); whereas, at the end of a fortnight or three weeks, I think an elbow joint should certainly be put at a right angle if there is any or the slightest suspicion that a movable articulation can not be obtained. This man obtained considerable benefit by the breaking down of what I imagine must have been new tissue; that is to say, when he left the hospital his arm was at a right angle. Though a good deal of swelling and pain attended the forcible flexion, I can but think I was justified in any proceeding short of making an external wound to render this man's limb more useful; he was eccentric, if not insane, and used to express himself in the most energetic and decided language as to the immense amount of good I had done him, but whether he did not heap a corresponding amount of abuse afterwards I am unable to say; his opinion, therefore, was not of so much value as that of many men might be under similar circumstances.

CASE 17.—*Acute synovitis from injury.*

William Benson, æt. 14, admitted August 30th, 1870.

At 5 a.m. August 30th, struck himself with pitchfork at inner side of left knee. He was admitted, but would not stop. In the evening, however, he came back, as his leg was painful. The dresser stated that from direction of wound it must have wounded the joint.

On admission.—A small wound on inner side of knee-joint (left), and acute synovitis of joint. The limb was placed on a back splint, and ice applied.

On September 21st was nearly well. Splint was removed and knee strapped, and on September 24th he went out.

This was one of those interesting cases of wounds of a joint in which the air appearing to be entirely excluded from the interior, and the accident occurring in a youth, no untoward result happens. That the joint was entered by the fork I have no doubt; at least, the effusion and other symptoms of synovitis show it as plainly as anything can do, but the immediate withdrawal of a small pointed instrument like a pitchfork gives no opportunity for the entrance of air, and consequently the results are not so severe as in a lacerated wound. The subsequent progress of the case after the first few hours indicate sufficiently well the severe nature of the injury, and if it had not been treated by absolute rest and cold applications most probably some disastrous result would have accrued. But what will not boys recover from ?

CASE 18.—*Chronic mammary tumour, breaking down and ulcerating. Excision of breast.*

Janet Henman, æt. 52, living in London, admitted into Charity Ward, August 17th, 1870.

Is married and has four children, the youngest now being nineteen years old. It was suckled equally well with both breasts. No family history of cancer.

About three years ago a hard lump, of size of cherry-stone, came at outer and lower portion of right breast. This increased

in size, occasionally giving her pain of a darting character. A short time since a portion of mass softened, and a fortnight ago burst, and has since continued to discharge matter and some blood. For the last month has lost appetite and got thin, and for a fortnight has had a small lump in right axilla.

On admission.—Is thin, and has a sallow cachectic aspect, but this is not very marked. The outer part of right breast has on it an irregularly oval excavated ulcer, about one inch and a half in its long diameter. Above this are two smaller ulcers of similar character. Neither nipple nor adjacent skin are in any way involved. Most of the breast is occupied by a hard tumour, pretty regular in outline, not very tender, the skin over which is movable, and the softening down of a part of which appears to give rise to the above-mentioned ulcers. There is no infiltration of the surrounding tissues nor enlargement of veins. There is a small inflamed gland in axilla.

As the case from the first was considered a simple one, and the patient's reparative power did not appear to be great, removal was advised. This she would not consent to, so iron and quinine and good nutrient food were exhibited, and the breast supported and the edges of ulcer approximated by strapping. Under this treatment patient's health improved very much, but the breast did not get on, and on October 10th she consented to its being removed. This was done on October 11th. All the vessels were twisted, and the edges brought together by strapping and sutures; and on the 14th, when the dressings were removed, the wound had nearly wholly united by primary union. By November 4th all was well, and the patient went out.

The tumour on examination proved to be an adenocele, breaking down.

CASE 19.—*Recurrent enchondroma of right thigh ; amputation.*

James Bevan, æt. 26, a silk printer, residing at Dartford. Admitted into Luke, August 16th, 1870. Has always been a healthy man.

From March to July, 1869, was in Samaritan, when a large enchondroma, growing from lower and back part of right femur into popliteal space, was dissected out with some difficulty by myself. He left Guy's with the wounds nearly healed,

but got about too much, and was eventually laid up. The leg swelled again, and increased so rapidly the last month, that he became alarmed, and again came into Guy's.

On admission.—Several sinuses at outer and lower part of right thigh, and there is an immense amount of thickening about this part, the circumference exceeding that of the other leg by two inches. Complains of pain in part.

Lungs healthy; slight systolic aortic bruit.

The swelling was considered to be due either to diseased bone or to return of growth.

On August 22nd the part was unsuccessfully explored as regarded dead bone. As the mass pressed on and involved the joint, and the discharge from sinuses and wound was very weakening, amputation was recommended, but the man refused, so stimulants and good diet were given, with local sedative applications to parts. However, by October 4th he was in a better condition, both of mind and body, and then consented to the operation being performed. The mass by this time involved the lower third of the thigh; there was no motion in joint, and the skin was not involved.

Chloroform was given, and the thigh amputated just above the middle. The flaps were lateral through the skin, and circular through the muscles. All the vessels twisted, and the flaps brought together by sutures and strapping.

Four days after the operation a portion of sutures were removed, and six days after the remainder. Union by primary intention, except lower inch or inch and a half of wound. There was free discharge from this part, which was poulticed for a day or two. Three weeks after operation all had healed except a small opening, in which a small piece of rough bone could be felt. The man's condition was all along good; indeed, he picked up wonderfully after the operation, and went out, November 17th, well, with the exception of a small opening leading to the dead bone. He complained, however, of pain about the trochanter and upper part of the thigh, and it was doubtful whether these pains were precursory to a return of the disease.

Examination of the limb.—The tumour was connected with the posterior part of the lower third of the femur. It grew from the femur, and had a broad, strong, firm, bony root. External to this bony skeleton the growth was cartilaginous, interspersed

with a moderate amount of fibrous tissue. Active ossification was going on, extending from the bony skeleton towards the periphery of mass. The tumour was very large, nodulated, and pressed on and otherwise involved all the tissues of lower half of back of thigh.

CASE 20.—*Epithelioma of face.*

Mary Welsh, æt. 53, a farm labourer (?), admitted into Charity Ward, August 25th, 1870.

Her family history is good, and she has always been a healthy woman. A year ago noticed a small wart on right malar bone, which increased, latterly very rapidly, until it attained its present size. It has been very painful, and her general health has suffered very much. A week ago it began to ulcerate.

On admission.—A large, comparatively superficial, malignant mass, ulcerating in parts, occupied nearly the whole of left side of face, leaving, however, the eye and its appendages, the forehead, nose, and mouth clear. There is a fœtid serous discharge and severe darting pain. The mass is movable on subjacent parts.

On September 2nd chloroform was given, and every means taken by passing acupressure needles beneath it to isolate growth from subjacent and adjacent parts. The wire of galvanic cautery was put round growth under needles, and the growth removed, care being taken not to let wire come into contact with needles, and so interrupt current. No blood lost, and a circular white escharred surface left, in which was seen the malar bone laid bare. About a fortnight afterwards the slough came away, the wound was healthy, and healed fast, the exposed portion of malar bone shelling off. At the end of month she left, the wound being nearly cured.

CASE 21.—*Epithelioma of tongue.*

James Carr, æt. 45, a tinman, admitted into Luke Ward, September 22nd, 1870.

Family history good. Has been a hard drinker, and for the last twenty years has smoked an ounce of tobacco every day in an ordinary "clay," using the pipe, however, on both sides of his mouth. For six years has suffered from slight stricture of urethra. Has been subject to sore tongue for years, which has

generally got well. In June, 1870, his tongue became sore and did not get well, but a small " hole" formed, and it got very hard, &c. ; its size and the soreness attendant on it caused him to seek advice.

On admission.—Is moderately well nourished. On left side of tongue, just behind tip, is a hard, circumscribed mass, ulcerated externally, and painful on pressure. No enlarged glands. Has several bad teeth, and canines on both sides are marked by stem of pipe.

October 4th.—Chloroform given, the tongue pulled out, pins passed so as to isolate growth, and growth removed by galvanic cautery ; no hæmorrhage.

8th.—Slough began to separate, and some hæmorrhage occurred ; uses disinfectant lotion to correct fœtor of discharge.

12th.—All going on well ; eats and sleeps well.

28th.—Went out ; wound in tongue healed ; glands below jaw could just be felt.

The case of tumour in the breast was highly instructive to the students, the larger number of whom, never having seen an ulcerating adenocele, mistook it for cancer. It reminds me almost exactly of one removed about twelve years since, where the whole tumour had ulcerated ; the skin represented a large fungating mass. The drawing of this latter was shown by Mr. Birkett in his recent lectures at the College of Surgeons. The case under treatment was not so severe as that of my former patient, but sufficiently ugly looking to deceive many, not versed in diagnosis, who saw it ; immediately, however, the precise characters of cancer were looked for the case was at once cleared up. The report shows the most thorough absence of these, and is well worth careful perusal. The power of repair in these growths is, I may say, *nil.* Not the slightest attempt at healing appeared ; and the woman, feeling that she was in good health, and yet that the breast had not healed, consented at last to my removing the growth.

The case of enchondroma of the thigh was by no means a satisfactory one in the earlier operation, when the growth was removed from the femur. At the back and lower part of the thigh both large nerves were lying over the tumour and had to be carefully avoided. With great difficulty, at such a depth,

the chisel and gouge removed the mass, but it was felt at the time that amputation had better have been performed. I urged this upon the patient, but he would not consent, and the ease with which he had worked almost up to his admission into the hospital, and his remarkable freedom from pain, were the reasons why he could not be induced to submit originally to the more serious operation. On a second admission I was anxious, knowing the nature of the case, to amputate at the hip-joint, but this he positively refused and left the hospital very abruptly, to return again after a few weeks, on the date given in the report; and though I again urged the propriety of submitting to this amputation he would not consent, and only after much persuasion as to the uselessness of attempting any more local proceedings would he consent even to amputation as performed.

The epithelial cancers reported were both removed by the galvanic cautery as used at the hospital (Middeldorpf's battery), and the one on the face could not have been so effectually removed without any loss of blood by other means. The operation was one of the most satisfactory that could be imagined or seen. By taking care in passing the pins, not through the tumour and not touching one another, by also taking great care that the wire used in the removal does not touch the pins, as speedy a removal may be accomplished as is consistent with the freedom from bleeding so much to be desired. Indeed, this patient may be said not to have lost a drachm of blood, as the only few drops that were seen were occasioned by the introduction of the pins. The only pain this patient suffered afterwards was, first, in the separation of the slough, and, secondly, as puckering occurred when the process of cicatrization was advancing, she then complained of the dragging on the parts around. The progress of the case from beginning to end was one of the most satisfactory that could be conceived. The hideous mass seen on her admission into the hospital, the horrible pain she endured, the offensive discharge rendering her a nuisance to every one who came near her, and the depressed and almost dying state in which she was admitted, all these conditions were so entirely changed on her exit that she might almost be said to have risen from the dead. Any other mode of procedure than removal by the cautery was, I think, out of the question; certainly the use of the knife would have been attended with so much una-

voidable and uncontrollable hæmorrhage, that her life would have been well-nigh sacrificed in the attempt. It was just, therefore, one of those cases in which the galvanic cautery is so peculiarly well suited.

The case of cancer of the tongue necessitates no other observation than to cite it as one of the class where a highly vascular organ requires the removal of a mass from its substance, and where, therefore, of necessity, violent hæmorrhage, so damaging to the after recovery of the patient, is likely to occur. If this hæmorrhage can be prevented, and the tumour removed more effectually than, or even as effectually as, by the knife, there is a great gain ; and consequently, though as, a rule not considering that any incisions are equal to those made by the surgeon with the knife, there are certain classes of cases, of which the two that I have reported may be considered as types, in which undoubtedly the less surgical proceeding of removal by the galvanic cautery becomes the more advisable.

ON SOME

OBSCURE FORMS OF ABDOMINAL DISEASE.

By S. O. HABERSHON, M.D.

THE obscurity of the early stages of some forms of abdominal disease, and the numerous sources of fallacy which interfere with our correct diagnosis, are well illustrated in the following cases.

I. ABDOMINAL ANEURISM.

Aneurism of the abdominal aorta simulating spinal disease; aneurismal sac behind the artery; paraplegic symptoms.

CASE 1.—Henry W—, æt. 30, was admitted into Guy's Hospital on November 2nd, 1870, under my care. He had been a sailor, and had drunk freely of ardent spirits. Five years before his present illness he had had syphilis; a chancre was followed in five weeks by rash on the legs, chest, and back. He had been ill for five months, and the first symptoms were pain in the right side and across the loins, with weakness. The pain passed round the abdomen, as if a cord were tied round the body. He had kept his bed for three months; the legs had become weak, and there was partial numbness in them; the bowels for two months had become confined, only acting about once in five days. Sometimes he had difficulty in passing his urine, but never to any marked degree.

On admission he was pale, fairly nourished, but the countenance was expressive of suffering. On examining the spinal

column no irregularities nor local tenderness could be detected, but there was pain across the loins and round the abdomen; the abdomen was not distended, and no enlargement could be found on manual examination; the bowels were confined. There was no evidence of thoracic disease; the pulse was full and regular; the tongue was slightly furred, and the urine was healthy.

He was ordered the compound confection of senna (Guy's) and the iodide of potassium, with syrup of iodide of iron.

On the 14th of November he continued in the same pain, but the bowels were more regularly acted upon. He was then ordered quinine with iodide of potassium.

On the 21st the patient became prostrate, the lips were blanched, the pain more severe, and a pulsating tumour was found on the right side. Death on the following day was preceded by slight convulsion, and by unconsciousness of about two hours' duration.

Dr. Moxon made the inspection twenty-six hours after death, and the following is his report:

There was but little blood in the spinal veins; the cord was anæmic, it was firm to the touch; the twelfth dorsal and first and second lumbar vertebræ were eroded, the eleventh dorsal and the third lumbar were affected to a less extent; the intervertebral substances were prominent. This part of the spine formed the back of the false aneurismal sac, which had ruptured a few hours before death. On the right pleura there was a patch of recent lymph at the lower and posterior part; the lungs were pale, but healthy; the heart was healthy, its weight 10½ oz., non-hypertrophic, the right side contained a small quantity of tough fibrin. The aorta in its upper two thirds was diseased in parts; at the middle of the thoracic region was a soft flabby patch, which was devoid of its normal resiliency and consistency; this portion was pale, and of a bluish-white colour, and it presented a remarkable contrast to the surrounding healthy substance. The section of the artery showed that at this part the normal thickness of the coat was reduced to one fifth; the outer and middle coats could not be traced through the diseased part. This part of the artery had a mottled reddish-white appearance, and under the microscope presented minute pale cells with some elastic fibres. The back of the aorta opposed to the first lumbar showed a rent in the artery with well-defined edges, one inch by three

quarters of an inch in size; a film of fibrin passed from this opening into a false aneurismal sac, about the size of half an orange, but on one side the arterial wall turned into it. The sac was coated with rugose fibrin; it rested posteriorly upon the bodies of the vertebræ, and it had burst on the right side; about a pound and a half of blood had distended the right lumbar and iliac region under the peritoneum, and reached three inches on the anterior wall of the abdomen. The intestines were contracted and healthy. The liver was somewhat enlarged and congested, but healthy; the spleen was normal. The region of the receptaculum chyli was wholly destroyed by the aneurism, and the position of the vaso-motor nerve was invaded. The kidneys were very pale, 11 oz. in weight; some extravasated blood had reached the posterior part of the bladder; the testicles were healthy.

This case was at first regarded as one of spinal disease, and it was thought that the syphilis contracted a few years previously had been the cause of that disease. The pain in the course of the spinal nerves, the weakness and partial numbness in the legs, the constipation and weakness of the bladder, indicated spinal mischief; but the pressure of a false aneurismal sac upon the spinal nerves at their exit was the real cause of these symptoms, and the syphilis was only connected with them as a possible cause of arterial disease. The sac was behind the artery and in front of the bodies of the vertebræ; it could not be felt during life, and the constipated condition of the bowels rendered examination still more difficult. The rupture of the sac and extravasation of blood among the lumbar muscles formed a tumour in the loins, and indicated the true character of the complaint. This extravasation of blood was the immediate cause of death.

A rent in the posterior wall of the artery led into the sac; which, however, was not a large one, being about three inches in length and two in breadth. The bodies of the vertebræ were eroded, and the nerves were involved at their exit. The cartilages were entire; the aorta was, therefore, in front of the sac, and the enlargement could not have been felt during life. If the tumour extend in front of the aorta the difficulty in diagnosis is great, but it is much more so when a small aneurismal sac is placed between the aorta and the body of the vertebra.

The coats of the abdominal aorta were extensively diseased;

they were rough, thinned, and contained deposit in them. The intemperate habits and muscular exertion of the patient had probably much to do with the disease, and Dr. Moxon may be correct in referring the deposit in the coats of the artery to syphilis. We must refer to his own account of the microscopical changes.

Aneurism of the aorta, both in the chest and abdomen; rupture; symptoms resembling those of renal calculus.

CASE 2.—Richard B—, æt. 49, was by trade a shoemaker, and of professedly temperate habits; he was a strong, well-built man, and his general health had been good; he had had syphilis when a young man, but no secondary symptoms had followed. For four months he had suffered from pain about the left kidney, which he described as "*the size of a shilling.*" The pain came on gradually, and by degrees extended to the front of the abdomen. There was no reliable account of blood being found in the urine. For two or three days the pain "had shot down into the left testicle." On admission the face presented the capillary congestion noticed in free drinkers. The patient reclined with his shoulders supported by a pillow, and groaned with pain. He was unable, from the severity of the pain, to lie upon the back. The pain in the left loin was increased by pressure and by any movement. There was no retraction of the testicle, but the patient said that it became swollen. The pain extended in the course of the genito-crural nerve to the front of the thigh and to the testicle. The chest sounds were normal, and there was no cardiac murmur. There was nausea, but no vomiting; the tongue was moist and white, the appetite bad, the bowels regular, the pulse 96, the skin normal in temperature. The urine was passed slowly, in a dribbling stream, but the flow did not stop suddenly nor was there pain at the end of the penis. The water was of a deep amber colour, clear, two pints during the twenty-four hours; it contained urates, but no albumen and no blood. The pain over the kidney was continuous, but there was sudden darting pain across the abdomen when he remained perfectly at rest. Colocynth and henbane were given to act on the bowels, and soap and opium to relieve the pain. He was admitted on the 14th November, and

on the 16th he had slept better, but complained of numbness over the outer and upper part of the left thigh, in the course of the branches of the external cutaneous nerve; the pain continued the same, being, however, more severe during the night.

He died on the 19th, at 4 o'clock in the morning, having had severe pain and " cramps" in the front and back of the thigh ; he requested the nurse to rub him, and suddenly became pallid, fainted, and sank at once.

Inspection was made by Dr. Moxon thirty hours after death. The brain was healthy ; the cartilages of the ribs were ossified ; the trachea was flattened near the bifurcation, especially towards the right side, and a small aneurismal sac was partially adherent to that part. The lungs were deep in colour from pigmental deposit, but were otherwise healthy. The heart was rather small, and the muscular fibre was somewhat mottled.

The aorta was extensively diseased. In the ascending aorta, three quarters of an inch from the innominate, there was an aneurism the size of a large walnut; it projected backwards and to the right, and it had produced flattening of the trachea. Passing along the course of the aorta, on the posterior and left aspect of the arch, was a yielding of the arterial coats, an inch and a half in diameter. The width in this pouch was larger than in the first aneurism. The lining membrane was carried completely through it, whilst in the first one the lining was broken through, and a false aneurismal sac was formed. This exoparietal aneurism was close to the origin of the vena cava superior, and it must have somewhat narrowed that vessel. The thoracic aorta, in its descending part, was extensively diseased ; its lining membrane was rugged; it was covered with ante-mortem clots, and there were small dissecting aneurismal channels re-entering the artery. There was a large aneurism at the left side and at the back of the abdominal aorta, immediately below the diaphragm; its orifice was one and a half inches long and three quarters of an inch wide; it extended back to the bodies of the vertebræ, which were eroded slightly. The aneurismal sac passed to the left side behind the kindney, which was raised in front of it. The sac had burst downwards. The clot reached Poupart's ligament.

The renal vessels were below the orifice of the aneurism ; the

cœliac axis and the superior mesenteric arose from the aneurism. The lower part of the sac pressed upon and flattened the second lumbar nerve at its exit, close to the psoas muscle. The femoral, brachial, and radial arteries were quite healthy; the posterior tibial was slightly atheromatous. There was but little fibrin in the aneurism. The pulmonary artery was free from atheroma. In the abdomen the left lower half of the peritoneal wall was raised by a great effusion of blood, which had coagulated beneath it. The stomach and the intestines were healthy. The liver was pale, but rather coarse in structure. The spleen was soft and pale; it was six ounces in weight. The kidneys were healthy.

Aneurism of the abdominal aorta at the cœliac axis, gastric symptoms, pain in the testicle; rupture behind the peritoneum.

CASE 3.—John P—, æt. 34, was admitted under my care at the close of the year 1867.

He had had syphilis seven years previously, and three months before his last illness, after lifting a heavy weight, severe pain came on, followed by gastric symptoms, everything being rejected from the stomach. There was a sense of throbbing to the left of the umbilicus, and severe pain extended through to the back. There was also great pain in the right testicle. The urine was normal.

A pulsating tumour, the size of a hen's egg, could be felt beneath the false ribs, an inch and a half to the right of the umbilicus; no murmur could be heard at the tumour. The patient died suddenly, and inspection was made on January 26th, 1868. There was an aneurismal sac the size of the fist in front of the aorta, at the cœliac axis, the superior mesenteric artery arising from it; the sac had given way at the posterior part, and blood had been effused behind the aorta, raising it from the spine; some blood had passed into the transverse mesocolon. The aorta was generally dilated, and presented thickened patches; there was some deposit on the aortic valves, and at the origin of the great vessels of the head and neck. Other viscera were healthy.

This patient's habits of life had induced disease of the arterial coats, and violent exertion had increased the disease; but three

months before death, from overlifting, the artery itself gave way, and aneurism was produced. The pulsating tumour in this case and the sudden onset of the symptoms rendered the diagnosis more easy than in many cases, but the gastric symptoms and the pain in the testicle might have easily misled us; the former symptoms arose partly from pressure upon the pyloric portion of the stomach and from implication of the nervous structures; pressure on the origin of the genito-crural caused pain in the testicle.

The part of the abdominal aorta that is most frequently affected with aneurism is the upper part at the cœliac axis and at the origin of the superior-mesenteric artery; in many instances it is the cœliac axis itself that is affected, or the latter artery is found to spring from the aneurismal sac. The artery is in nearly every case previously diseased; from intemperance or other cause the coats of the artery have become thickened, deposit has taken place in them, the surface is rough and scabrous, the normal elasticity is lost, and when unusual pressure is applied from any sudden strain the vessel gives way and aneurismal bulging is produced, or an actual rent takes place in the coats of the vessel. In the third case a sudden and violent muscular effort was followed by violent pain, and the symptoms of aneurism were soon manifest.

The age most liable to this form of arterial disease is below 40, during the prime of life, whilst the muscular power can be put forth in violent exertion. Of the three cases just recorded, the ages were 30, 49, and 34. Men are much more prone to the disease than women, as being more exposed to powerful muscular efforts; in fact, it is very rare to find women affected by it. Last year a woman aged 47 died in Guy's from apoplexy, with gouty disease of the kidneys. She was brought to the hospital in a comatose condition, and it was said that she had suffered from pain in the back and was pregnant. The uterus was normal, but just below the superior mesenteric artery was an opening in the anterior wall of the aorta three quarters of an inch in length and half an inch in breadth, leading into an aneurismal sac the size of an orange; the aneurism was lined with laminated fibrin. The kidneys were wasted, pale, and contained cysts; the heart was hypertrophied, the valves were thickened; the vessels of

the brain were diseased, and in the left corpus striatum was an extensive apoplectic effusion, which had broken through into the ventricle.

It is not usual for many months to elapse after the formation of a pulsating aneurismal tumour before the disease terminates; instances, however, occasionally occur in which the deposition of fibrin in the sac will ward off fatal rupture, and the patient may die from other disease, as in the case just narrated. A sailor, æt. 39, died in Guy's in November, 1867, who four years previously had suffered from giddiness and pain in the limbs. Two years later he was in the hospital under my care with pulsating tumour in the neck, and it was not till two years afterwards that he was readmitted, having increased pain in the lower dorsal vertebræ, the ninth, tenth, and eleventh. He died suddenly from rupture of an aneurismal sac into the peritoneal cavity.

As we have previously remarked, and as the cases recorded indicate, the diagnosis of aneurismal disease of the abdomen is often very obscure; severe fixed pain, subsiding in severity during the day, and even ceasing altogether, but during the night coming on in paroxysms of great intensity, is perhaps the most constant sign of abdominal aneurism. The pain is sometimes relieved by position, as by turning on the face, but this is a deceptive indication. A pulsating tumour is a sign that is naturally sought for, but there are numerous fallacies, and the greater proportion of pulsating tumours are non-aneurismal. Tumours are pulsating—

1st, from contact with an artery.

2nd, from the vascularity of a growth.

3rd, from communication with an artery.

Excessive pulsation in the abdomen is complained of by many patients who suffer from dyspeptic symptoms and from hypochondriasis; the pulsation is in the position of the aorta and in its course, but no enlargement is detected; abnormal pulsation is also experienced in regurgitation through the aortic valves, especially when the arterial coats are diseased.

Tumours in contact with the aorta are either growths in the left lobe of the liver near the lobulus Spigelii, or at the pancreas, or its neighbouring glands, or in the stomach, or in the duodenum, or in the mesentery; in these several positions tumours may receive communicated pulsation. Dr. Stokes has

justly remarked that if the growth grow from below upwards it is probably non-aneurismal, for aneurismal enlargements generally commence above and extend in a downward direction; in these non-aneurismal tumours the pulsation ceases, if the growth is separated from the artery; it may, perhaps, be pushed on one side or the other, or if the patient be placed on the hands and knees it may fall from the aorta; in many cases this cessation of pulsation will not serve us in diagnosis, but it is of more avail in gastric and intestinal tumour than pancreatic or glandular, from the fact that the former are more moveable. Pulsation is less uniform in simple tumours than in aneurismal ones; the bruit is less distinct, and would cease if the tumour were removed from the vessel. These tumours are more irregular in character and firmer in structure than true aneurisms.

The vascularity of medullary growths, and the consequent pulsation, were well illustrated in a gentleman, who was under my care some years ago, with extensive cancerous ulceration. There was a growth felt in the gastric region, with distinct pulsation in whatever position the patient was placed; there was pain after food, vomiting, progressive emaciation and cachexia. The vomited matters contained blood, and after a time portions also of cancerous growth. The diagnosis was not difficult, and it was confirmed by subsequent examination, but at an early stage it might readily have led to a mistaken diagnosis.

Aneurismal tumours are more or less spherical, they are yielding to the touch, and there is uniform expansion. They are generally situated in the upper part of the abdomen, near to the left hypochondriac region.

A systolic bruit may be heard in an aneurismal tumour, but pulsation occurring directly after the diastole of the heart is regarded by Dr. Stokes as of still more diagnostic value. Neither of these are constant signs. A systolic bruit may be produced by pressure, and the diastolic pulsation is not always to be recognised.

The absence of cachexia and of general disturbance of the system are very observable in aneurismal disease; the countenance is expressive of pain, but it is without the characteristic appearance of ulceration or of cancerous disease. There may be vomiting from pressure, as in one of the cases mentioned, but there is a want of regularity in the symptoms, and, as a rule,

there is no functional disturbance of the abdominal viscera. The liver may be pushed aside, but there are no indications of jaundice, nor of ascites, nor of enlarged veins on the surface of the abdomen; there may be severe pain in the loins, irritation of the kidneys, and pain in the testicles, but there is no blood in the urine, as in renal calculus; there is intense abdominal pain, but it is not the pain of peritonitis, it is neither increased by pressure nor is there peritoneal friction-sound. There is severe pain in the back, but the weakness of the legs, as mentioned in the first case, is the exception rather than the rule. It is by a process of exclusion that we arrive at the belief of aneurismal mischief, especially in those instances in which the sac is behind the aorta, and no pulsating tumour can be reached. Intense pain of a fixed but paroxysmal character in men during early manhood, without evidence of functional disturbance or of spinal disease, is in itself always suspicious of aneurismal disease. The pain is sometimes so intense that it may produce fatal exhaustion, as with a patient in Guy's under the care of my late colleague, Dr. Barlow, some years ago; an aneurismal sac, from the upper part of the aorta, of small size, produced intense suffering; the sac did not rupture, and after death I found the large branches of the vaso-motor nerve spread out like a web upon the sac. If the sac give way into the peritoneum, death is very sudden. A year or two ago a patient in the hospital affected with aneurismal disease had got out of bed, and was shortly afterwards found dead upon the floor. If the sac have given way behind the peritoneum, hæmorrhage is more gradual, and consequently the exhaustion is slower; in the first case recorded the hæmorrhage was into the loins, a pulsating tumour was felt there, the patient became blanched, and sank in a few hours. The effusion often takes place behind the peritoneum, in the iliac fossæ and into the mesentery; in a patient under the care of my colleague, Dr. Rees, the effused blood extended through the aortic opening in the diaphragm into the posterior mediastinum, and reached the neck; there was afterwards sudden effusion into the peritoneum.

If the aneurismal sac can be isolated, the plan advocated by Dr. Murray may be adopted, namely, of placing the patient under the influence of chloroform, and then of applying pressure so as to check the circulation; but aneurismal disease is gene-

rally near to the diaphragm, or it is situated deeply in the left hypochondriac region, where pressure could not be applied, or, again, as in the first case, it may be behind the aorta, so that the sac itself could not be compressed. Quietness, rest, opiates, the avoidance of excitement, of fatigue, or of exertion, are the best remedial measures that we can employ. The use of acetate of lead, of iodide of potassium, or other drugs, does not appear to check the progress of the disease.

II. Pyloric Disease.

Sarcomatous disease of the pylorus ; dropsy ; œdema of the abdominal parietes ; chylous serum in the peritoneum.

Reported by Mr. A. H. Haines.

Case 4.—Rachel B—, aged 47, admitted October 19th, 1870. She was a married woman, residing in the New Kent Road, and had suffered for twelve months, at first from pain and vomiting after food. She had gradually become weaker and thinner, and for one month had had cough. A year ago the feet and ankles began to swell, and soon afterwards the abdomen enlarged. She had occasional pain in her back. Menstruation had ceased for eight months.

The patient had a sallow complexion, she was much emaciated, and the conjunctiva was slightly œdematous. She complained of cough, and of occasional sickness after food, of pyrosis, and pain in the left side ; the pain sometimes extended to the back. There was anasarca of the whole of the lower extremities ; the abdomen was much enlarged, especially on the left side, which was quite dull on percussion ; the abdominal walls were very œdematous, and, from the position always being towards the left side, the water gravitated in that direction. Although there was fluid in the abdomen, fluctuation could not be felt easily, on account of the œdematous state of the parietes. No enlargement of the liver nor of the spleen could be felt. There was some doubt as to whether any ovarian enlargement or cyst existed on the left side ; but vaginal examination did not indicate any ovarian disease. The sounds of the heart were very feeble, the first sound being scarcely audible. There was some prolongation of the expiratory murmur, other-

wise the chest was healthy. The tongue pale and slightly furred, the bowels acted regularly, the pulse was 74 and compressible in character. The urine was free from albumen, its sp. gr. 1028.

Tincture of iron, in ♏xv doses, was ordered three times a day. The fluctuation in the abdomen became more distinct, but she suffered from occasional pyrosis and sickness. The abdomen became more tense, but the pain ceased. A small blister was applied to the œdematous portion of the abdomen, to form a mechanical outlet for the serum in the parietes. Some erythema appeared on the legs from distension, but soon ceased. On November 9th vomiting had been troublesome, and there was a little pain in the chest. On the 10th report stated that severe pain in the chest last evening was relieved by brandy; the next morning the countenance was anxious and the pulse very compressible. After her dinner she was seized with violent pain in the epigastrium, she soon became collapsed, and died at five o'clock.

Inspection was made the following day by Dr. Moxon. The lungs were collapsed and healthy. The heart was small and atrophied. The abdomen was greatly distended, and contained a considerable quantity of fluid, of a milky appearance, in the peritoneum. The stomach also was greatly distended with dark coloured fluid, consisting of semi-digested food and blood. The pylorus was very much thickened; the submucous cellular tissue was an inch in thickness, white, fleshy, œdematous, without cancerous juice, the thickening becoming gradually less, but reaching nearly five inches from the pylorus. The muscular coat was very much hypertrophied, a quarter of an inch in thickness at the pylorus; the enlargement terminated abruptly at the valve. There was slight ulceration at one point, as large as a threepenny piece. There was some obstruction in a few of the mesenteric glands and lacteals. The microscope showed that "the greater part of the white tough substance was composed of organized fibrous tissue, but in parts the substance was a more delicate tissue, with numerous small spindle-shaped cells with very long tails blending in the intercellular fibroid or fibrillated texture." The mucous membrane itself was unaffected. Dr. Moxon in his report designated it as sarcoma, and compared it to scleriasis of the skin. The peritoneal fluid was white, highly albuminous, its sp. gr. was 1010, and the deposit contained some fat-globules. The liver weighed 44 oz.,

it was healthy; so also the pancreas and the spleen; the gall bladder contained half an ounce of clear healthy bile; the kidneys, ovaries, and uterus were healthy. The serum from the legs was perfectly clear and limpid; its sp. gr. was 1011.

This was a very remarkable and unusual form of disease, and the diagnosis was obscure; the patient was wasted, she had a depressed and anxious countenance, and the aspect was that of malignant disease. The legs were œdematous, and especially so the abdominal parietes, and as the patient reclined towards the left side, the fluid gravitated in a marked degree in that direction. This œdema of the left side produced dulness, which was increased by some peritonitic effusion; the patient, however, could not remain a sufficiently long period on the right side to allow the fluid to gravitate there, and the dulness was so persistent that the idea of an ovarian cyst was suggested; but vaginal examination did not confirm the suggestion. A small blister was applied to the more dependent part so as to form an artificial outlet for the serum; this afforded some relief, and the day before the final aggravation of her symptoms she was quite cheerful, and said that she was better. The following morning severe pain came on, and collapse, which terminated fatally. Great distension of the stomach was the only apparent cause of the sudden exhaustion.

Fibroid disease of the pylorus is a condition with which all pathologists are acquainted; it appears to have its origin in the submucous cellular tissue; the condition of extreme fleshy thickening in the case just narrated was of a fibroid texture; it was most remarkable in character and appearance; but it had none of the elements of malignant growth, and consisted of fibrous tissue in different stages of development. The effect, however, was obstruction at the pylorus, and consequent exhaustion.

The hypertrophy of the muscular fibre had to a considerable extent counterbalanced the obstruction, for the vomiting had in great measure subsided; and the gastric symptoms had so far lessened, that the thought was suggested of sympathetic disturbance either from the ovaries or from the kidney. This leads me to remark that the subsidence of vomiting in organic diseases of the pylorus may take place from several causes. The hypertrophy of the muscular fibre may be sufficient to compensate

for the obstruction, or extensive ulceration may supervene, so as either to remove the obstruction or to destroy the sensitive branches of the pneumogastric nerve. An apparent removal of obstruction is found in some instances from exhaustion and dilatation. In the instance just narrated the stomach became enormously enlarged, and caused collapse. In other cases the vomiting may subside for several days, and then a very large quantity may be at once rejected. The post-mortem examination did not fully explain the cause of the dropsy; there was evidently obstruction in the lacteal vessels, and it would seem that this chylous impediment had produced the milky serum in the peritoneum, and possibly the œdema of the legs and abdominal parietes; whether the fleshy-white thickening of the submucous tissue at the pylorus was connected with some lymphatic obstruction could not be ascertained. There was no enlargement of the mesenteric glands, nor was there evidence of obstruction at the receptaculum chyli.

The symptoms were at first those of primary gastric disease, pain at the stomach, heartburn, vomiting; the latter symptom became severe, but subsided as those of dropsy manifested themselves, and on admission the patient stated that she had not been sick for a whole month.

In the two following cases the symptoms of gastric disease were obscured; in the first by spinal curvature and by jaundice, so that the liver was supposed to be affected; and in the second instance there was evident deposit at the pyloric region, but the vomiting was so completely in abeyance for a considerable time that the disease was supposed to commence in the pancreas, and then to extend to the stomach. The vomiting had, however, ceased, in consequence of the extensive sloughing of the deposit in the mucous membrane.

Jaundice; spinal curvature; cancerous disease of stomach simulating organic disease of liver; scarcely any vomiting, although the pylorus was affected.

Case 5.—John H—, æt. 45, was admitted August 25th, 1869, under my care. He was a labouring man, who had resided in the Dover Road, and till three years before admission

he had enjoyed good health. He then had gravel for three months.

At the beginning of July, 1869, he experienced loss of appetite, pain in the chest at the sternum and between the shoulders, particularly after taking food. He had also a fixed pain in the left side, which gradually extended to the right. A fortnight later jaundice came on, and increased till he applied at the hospital. There was then marked antero-posterior curvature of the dorsal spine, so that there was retraction of the hypochondria. The skin was decidedly yellow, but not very deep in colour. The chest was free from disease. Nothing could be felt in the abdomen, but the complaint was especially of pain towards the right side and round to the back. There was some nausea, but sickness was not a prominent symptom of his disease. After a short time, September 23rd, some nodules could be felt beneath the ribs, towards the right side; but it was difficult to manipulate deeply, on account of the retraction consequent on the spinal curvature.

There was constipation of the bowels, and the motions were very pale in colour. The urine was free from albumen, but contained the colouring matter of bile. The emaciation increased, the pain continued, and the patient slowly sank; he died October 1st.

On inspection it was found that a large cancerous ulcer existed in the stomach; it reached the pylorus; but the ulceration had removed the obstruction. The growth and ulceration extended for three inches, at least, into the stomach, and occupied both the anterior and posterior aspect. There were no nodules in the liver itself, but some enlarged glands had exerted pressure upon the bile-ducts.

In this case the symptoms pointed to organic pressure upon the bile-ducts, and the treatment adopted had reference to that pressure rather than to the stomach. Dilute hydrochloric acid with taraxacum and chloric ether, iodide of potassium, the syrup of the iodide of iron, and the hydrochlorate of ammonia, were given; the bowels were acted on by rhubarb, aloes, and podophyllin. The pain had been referred to the spine, but was evidently due to the cancerous ulcer of the stomach. It was remarkable how vomiting, which is such a common sign of cancerous disease at the pylorus, was absent in this case. During

the latter stages this was explained by the extent of the ulcera-tion, and at an earlier period of disease it is probable that the pylorus was less affected, from the mischief having commenced at the lesser curvature, and extending towards the pylorus, rather than from it.

Extensive ulceration of the stomach ; absence of vomiting for several weeks ; tumour.

(Reported by Mr. MICHAEL HARRIS.)

CASE 6.—Valentine Z —, æt. 44, was admitted under my care, November 17th, 1869. He was a married man, a German ; but for twelve years he had resided in England. Till about three years ago he had been employed in a sugar factory, and was tolerably well, but had never been strong. Eight months before admission he began to experience pain at the epigastrium and vomiting. For one month he had been unable to do any work, and had vomited three or four times a week ; he was spare and had a cachectic appearance ; he complained of pain and tenderness at the epigastric region, and there was a hard tumour to be felt in the region of the pylorus. The hardness measured three to four inches transversely, and two to three inches from above downwards. There was no jaundice, and no vomiting after admission. The bowels were confined, the motions clay coloured, the urine was loaded with lithates. He was ordered a castor-oil injection and the sedative mixture of bismuth (Guy's) three times a day.

December 30th.—He vomited more than two pints of blood, and nearly a pint on the following day. Oil of turpentine—mxx— was given every four hours. Soon afterwards he began to com-plain of flatulent distension, and steadily lost ground, although there was no return of vomiting.

On January 25th he again vomited, and on the next day he rejected a pint of bright blood.

29th.—He felt extremely weak, but experienced no pain.

February 18th.—He was anæmic, and complained of pain in the back ; a procident condition of the rectum troubled him a good deal, but still there was no vomiting. Charcoal was given to relieve the flatulence, and to some extent it afforded relief, but only for a short time.

April 5th.—The abdomen was distended with fluid; there was occasional vomiting; the patient was extremely emaciated and anæmic; small crepitation was audible at the bases of both lungs.

He lingered till May 10th, and died from exhaustion.

On inspection the most extensive ulceration of the stomach was found, both on the anterior and posterior surfaces, extending from five to six inches from the pylorus; the mucous membrane was in a sloughing condition, and the pyloric valve destroyed.

The absence of vomiting in this case was very remarkable; for many weeks together there was no rejection of food, although the patient steadily declined in health, and it was thought that the pancreas was probably diseased. No fat was found in the excreta, and after some time the vomiting of blood indicated ulceration of the stomach itself. Still the vomiting was never very severe. The post-mortem examination fully explained the symptoms. The ulceration and sloughing were so extensive that not only was the sensibility of the stomach destroyed, but the obstruction at the pylorus was also removed.

III. Perihepatitis.

Inflammation of Glisson's capsule; occlusion of vena portæ; blood cyst; dropsy; peritonitis.

(Reported by Mr. J. L. Moseley.)

Case 7.—Cordelia W——, æt. 34, a poor prostitute from Shadwell, was admitted into Guy's, October 1st, 1870. She was a native of Holland, had had no children, and had drank freely of spirits and beer.

She had been ill for several months, and at first complained, on January 30th, of a dull pain in the right side, the hepatic region; the abdomen soon began to swell, and two months later she came into the hospital for dropsy, under Dr. Rees's care. For three months the legs had been anasarcous. She was re-admitted under Dr. Phillips's care in October, and was suffering so much from abdominal distension that paracentesis abdominis was at once performed. When transferred to my care she was

. thin, and sallow; her countenance was distressed, her skin was
harsh and dry, and she complained of incessant thirst.   The
hepatic dulness extended higher than natural; the abdomen was
enormously distended; there was dulness on percussion, except
in the region of the umbilicus; the hypogastric and epigastric
veins were very much enlarged.   There was distressing wearisome
pain in the region of the epigastrium; the legs and thighs were
very œdematous; the bowels were often freely purged; the
urine was normal, no albumen was present.   The chest was
healthy; the pulse was 120, feeble and small; there were occa-
sional rigors, and she had but little sleep.   She had never
suffered from jaundice, nor had there been either hæmatemesis
or malæna.   Twenty-one pints of clear fluid had been removed,
but in a few days she was nearly as large as before.   Quinine
was given during the day, and at night the hydrate of chloral.
On November 1st the abdomen had become so much distended,
and the wound in the parietes from the previous tapping was
so bulging and thin, that it was evident the opening would
soon give way, unless the fluid was again drawn off.   There
was a good deal of general abdominal uneasiness before para-
centesis was performed, the surface was hot, and it was believed
that some peritoneal inflammation already existed.   Thirty-seven
pints were removed; it was slightly opaque, smoky-coloured
serum, and very albuminous.   The operation greatly relieved
the distress; the patient passed a good night; the pulse was,
however, weak and irregular, 105.   Opium gr. i was given night
and morning.   On the 5th she felt very comfortable, was free
from pain, but the abdomen was rapidly becoming again dis-
tended with ascitic fluid.   There was no appetite; brandy, ℥iv,
was allowed, with eggs, &c.   During the evening she became
insensible, and on the following day she was quite comatose.

The coma persisted till death, on the 11th, at 4 p. m.

Inspection was made by Dr. Moxon.   The brain was healthy,
but there was a little thickening of the meninges.   There was
some recent acute inflammation at the lower part of the pleura,
on the right side.   The lungs were healthy.   The heart was
small and contracted.   The abdomen showed subacute peritonitis,
long shreds of semi-organized matter fastening loosely the
various parts together, and masking yellow sub-turbid liquid,
some recent blood clots, and some brown pigment.   The intes-

tines were gathered in front of the spine, and adherent omentum was thickened and contracted. The stomach, colon, and liver were adherent, and with the gall-bladder were firmly fixed to the duodenum. The liver was very fatty, soft, but wasted and granular; some portions were deep coloured and small, whilst others were large, pale, and opaque from fat. The capsule of the liver was very much thickened, and there was a considerable amount of dense fibrous tissue at Glisson's capsule, compressing the vena portæ, and completely obstructing it, so that it formed a mere distended pouch at the fissure of the liver, and communicated with a blood-cyst, the size of a hen's egg, at the posterior part close to the Lobulus Spigelii. The cyst was so placed as to deflect the course of the vena cava. The contents consisted of turbid brown fluid. The stomach was coated with mucus and altered blood. The spleen was very large and adherent; its capsule was thickened, and there were numerous remains of embolic patches; the tissue was firm. The kidneys were pale and small; the pyramids were deep coloured, the capsule was not adherent, and the surface was rather granular.

The serous investment of the liver becomes inflamed in general peritonitis, and lymph is deposited upon its surface; in strumous peritonitis the deposit is of a less organized character; but these conditions, as part of a general disease, are of a different kind from the local disease designated perihepatitis. The liver is surrounded by a fibrous investment, and on the lower aspect this fibrous covering reaches the larger vessels at the fissures of the liver; a fibrous continuation of this envelope extends with the vessels throughout the glandular substance of the liver, and constitutes Glisson's capsule. These inner and outer portions of fibrinous tissue are separately affected in disease, or morbid action may attack them conjointly.

In inflammation of Glisson's capsule there is effusion throughout the gland; at first the whole of the liver is enlarged, and it is more dense than normal; but as afterwards the fibrous tissue contracts, the gland is rendered smaller in size; clusters of acini are separated so as to give a minute lobulated appearance to the section, and on the surface the smooth appearance is replaced by minute indentations, giving an irregular aspect to the gland; these indentations are due to the contraction of the fibrous effusion which has permeated the whole structure; and

the irregularities when large have been compared to hobnails ; but the condition is also known by the name of chronic indura- tion, cirrhosis, and from reference to its ordinary cause it is designated gin-drinker's liver. The slow contraction of the dis- eased product at Glisson's capsule leads to pressure on the vessels; their calibre becomes diminished; hence the circula- tion in the vena portæ is impeded ; and one of the common symptoms of this disease in its advanced stage is serous effusion into the peritoneum, congestion of the mucous membrane of the alimentary tract, enlargement of the superficial abdominal veins, and impairment of general nutrition.   The acini of the liver become atrophied, and some of them may undergo fatty degene- ration.

In a second form of disease,—perihepatitis,—it is the outer in- vesting membrane and that around the layer ducts which is espe- cially affected; there is at first a hyperæmic condition, followed by fibrinous effusion ; in the acute stage the symptoms are those of local peritonitis, pain in the region of the liver, febrile disturbance, with sallowness of countenance, sometimes with jaundice; in rare instances there is the formation of pus, which is found in the course of Glisson's capsule, but especially at the fissure of the liver, and, as might be anticipated, this condition quickly leads to a fatal result ; but when the disease becomes chronic the fibrin on the surface is organized, and forms a thick covering $\frac{1}{16}$th to even a quarter of an inch in thickness ; it is with difficulty separated ; it often forms adhesions with the diaphragm; it rounds off the edge of the liver, it obscures the gall bladder, and dips down into the liver itself, sometimes separating considerable portions ; in one instance I found that the whole of the left lobe of the liver was completely atrophied, from the contraction of the fibrin around the vessels which reached that lobe.   This leads me to the important fact that the fibrinous effusion at the fissure of the liver compresses the vessels at that part, as previously mentioned when referring to cirrhosis ; and in fact the two con- ditions of cirrhosis and perihepatitis may be combined to a greater or less degree. This contraction was remarkably shown in the case we have detailed : the fibrin had shrunk so as completely to *close the vena portæ*.   The vein formed a *mere sacculated pouch*, and communicated with a blood cyst near to the Lobulus Spigelii. The blood from the chylo-poietic viscera was compelled to find new

channels to reach the heart, and hence the great enlargement of the superficial abdominal veins. In reference to venous obstruction it will be found that in many instances of ordinary cirrhosis the contraction in the neighbourhood of the Lobulus Spigelii exerts some pressure upon the vena cava, which passes close to it, and thereby increases the anasarca of the lower extremities.

Perihepatitis is not observed in early life, unless there has been great intemperance; it is sometimes produced by blows; in syphilis there is a tendency to local fibroid disease and deposit, but we do not find the *general* forms of perihepatitis produced by syphilis alone; in chronic diseases of the heart, where there is long-continued congestion of the liver, the persistent tension of the fibrous investment produces thickening, but this is never to any very great extent. In hydatid disease of the liver there may be *local* fibrinous effusion near to the cyst, but a condition more closely resembling the state of general inflammation of the external fibrous envelope of the liver is the inflammation around the gall ducts, consequent on the passage of a gall stone; fibrinous effusion is then sometimes followed by decided thickening and contraction.

The early symptoms of perihepatitis are those of local peritonitis, with or without jaundice; the later symptoms are those of atrophy of the liver, obstruction of the vena portæ, and ascites. These later symptoms will be more decided in proportion as the contraction reaches the important vessels at the fissure of the liver; as in cirrhosis, there is a hindrance to the passage of blood into the glandular structure of the liver, and the symptoms are therefore identical. It was observed, however, in the case detailed that the abdominal veins were more than usually distinct, the obstruction being complete. In reference to the diagnosis of these cases we would simply advert to the fact that diaphragmal pleurisy is often regarded as acute disease of the liver, and when associated with pneumonia sallowness of the countenance, or even a semi-jaundiced appearance, tend to confirm the mistake.

In the early stage of the disease the treatment should be directed to the relief of local and hepatic congestion ; free action of the bowels by mercurial purgatives, and the cautious use of alterative medicines, will greatly assist the recovery of the patient ; bland and spare diet should be allowed; hot fomentations, or local

depletion used; saline medicines promote cure by their action on the kidneys and on the intestinal mucous membrane, as well as by modifying the effused product.

In later stages saline mineral waters, iodide and bromide of potassium, continued for some time, may afford relief; but they will be of no avail unless the most scrupulous care is observed as to the diet of the patient.

In the stage of ascites diuretics are of no value; they are not absorbed, and only annoy the patient. Purgatives and counter-irritants may partially relieve, but more is done by tonics and by sustaining the general health of the patient. If the peritoneal fluid has become very large, the question of tapping arises; but these instances of perihepatitis are most unsatisfactory cases for paracentesis. The serous membrane has already been inflamed, a persistent state of congestion remains, and very little additional irritation will produce general peritonitis; but when the ascites becomes extreme the diaphragm is pressed upon and its action is impeded, the stomach is unable to perform its function from mechanical pressure, and the patient is in extreme distress. For this reason the patient was tapped before she was under my charge. The same necessity very shortly presented itself again, but with increased disadvantages; the peritoneum was evidently inflamed, but it was found that sudden rupture would take place from the old wound, unless the tension was removed, and the operation was repeated as before described. Paracentesis is, therefore, a serious operation in chronic perihepatitis, and many patients sink from it. The peritonitis, however, which thus supervenes, is not accompanied with the ordinary symptoms of that disease. There is not the severe pain, nor the excessive tenderness of the abdomen, but a typhoid condition (as shown by uneasiness, brown tongue, failing pulse, and sometimes wandering delirium) precedes death.

IV. Fixed Abdominal Pain.

There are some persons who appear to be strong and vigorous; they are capable of undergoing great fatigue and violent exertion; their countenance does not indicate disease, nor does their muscular development show that they are in any degree amongst

the sickly ones ; but still they *are* patients, and seek for help. The complaint is of *pain;* and although it is not sufficiently intense to leave its trace upon the countenance, nor to wrinkle the brow, the pain exists, constant and wearisome, and sometimes severe. The brain is as active as ever, the pulse is quiet, and the chest strong ; the appetite does not flag, nor are the functions of the living economy disordered, but the suffering is sufficiently irksome to rob life of its enjoyment, and it prompts the patient to seek for its removal. One of the chief characteristics of the pain to which allusion is made is that it is fixed : it is not mere surface tenderness ; but when the situation is reached there is the unmistakeable expression " The pain is there ;" it is a fixed pain, and of a chronic character.

In reviewing the *causes* of abdominal pain, the first question is, whether the pain is superficial or deeply seated—whether it is extra abdominal, or extra peritoneal, or peritoneal. Pain of a local character may be due to disease of the *spinal column of the vertebræ.* In these spinal diseases the patient is sometimes scarcely able to bear the surface to be touched ; the most gentle pressure induces pain, and even before the hand reaches the surface there is an exclamation—" the cry before the hurt"—or the pain is described as passing round the side, or it resembles a tight cord round the waist : in these instances the hyperæsthesia is evidently to be referred to the morbid condition of the spinal nerves ; but in other cases the pain is more circumscribed, and it is found to be merely at the peripheral termination of the nerve in the skin, or it induces spasmodic contraction and rigidity of portions of the muscular parietes, and a phantom tumour is produced. Other symptoms show that the state of the whole nervous system is disturbed ; the brain is excitable, the senses are easily agitated, the appetite is uncertain or lost ; but it is not to these cases that we refer. The pain is here superficial ; it is *not* deep in character, nor is it generally fixed in position.

Another cause of fixed pain is *local inflammation in the parietes.* These instances are very obscure, and in the early stages difficult of diagnosis, especially when the mischief is at the posterior part of the abdomen. The febrile condition and the severity of the symptoms, the suddenness of their onset and the comparative rapidity of the course of the disease, dis-

tinguish these cases. They are more likely to be confounded with local peritonitis of an acute kind than with the fixed pain to which we now draw attention.

Some years ago a gentleman was suddenly seized with severe pain in the region of the liver and gall bladder; the suffering was great, the pain was persistent; there was no vomiting and no jaundice, but considerable febrile disturbance. He came in a few days to town, and I had an opportunity of carefully examining his condition. He was very ill; the countenance betokened distress; the pulse was rapid; the pain was diffused about the right side towards the epigastric and umbilical region. There was swelling at this part, and manipulation gave to the touch the impression that there was fluid beneath; but fluctuation could not be made out. There was no history of blow nor of wrench; nothing, in fact, to account for the local inflammation; nor were there symptoms to indicate functional disturbance of the stomach, nor of the liver; the pain was evidently not that produced by gall-stone. One of my surgical colleagues gave me the benefit of his assistance, but whilst agreeing with me that there was fluid, it was too obscure in character and too near the peritoneum to lead him to make any incision. The patient was recommended to apply warm fomentations and poultices; in about a fortnight's time the swelling became more prominent, the fluctuation was then distinct, and the abscess was opened. The severe symptoms then subsided, and the patient has since continued to enjoy immunity from abdominal pain. The severity of the symptoms in this instance distinguished it at once from the persistent abdominal pain of more chronic duration.

If the local inflammation be the *posterior* part of the parietes, the diagnosis is more difficult, and when the disease is chronic in character it constitutes one of the causes of the deep and fixed pain under our consideration; we shall again refer to these instances.

A severe form of abdominal pain is found in some instances of *herpes zoster* or *shingles*. Some years ago a stove-fixer, aged fifty-three, applied to me for severe pain in the lower part of the abdomen and in the testicle; it had lasted for several days; nothing was to be seen on the skin; there was no functional disturbance of the abdominal viscera; and although the

urine was apparently normal, the pain was so evidently in the course of the genito-crural nerve, that it was believed a calculus existed in the kidney, and that blood in the urine would soon be found. After a few days the patient again called, but a full crop of vesicles had appeared in the course of the nerve, and the true nature of the case was apparent; he soon recovered.

It is scarcely necessary to advert to acute peritoneal disease, or to acute visceral disturbance, since the malady which we are considering is essentially chronic in its character.

In *gastric affection* there is functional disorder, as indicated by pain after food or vomiting, by flatulent distension or per-verted sensation of the part, relieved or aggravated by diet; these and other well-known symptoms show that the stomach is affected; in the cases before us there is no functional complaint.

So also in chronic disease of the *intestine*, if there be fixed pain it will be found to be modified by the passage of the con-tents of the bowel, as the pain supervenes when the food has reached the diseased part, it may be two, three or four hours after a meal; or, in the case of diseased colon, the emptying of the bowel either induces or relieves the pain. A remarkable case of this kind came under my notice some years ago.

A young lady who had been the subject of severe pain in the abdomen for several years was brought by her attendant, a gentleman of much observation and practical research; the countenance was anxious, the body fairly nourished, and the peculiarity of her symptoms was that about an hour and a half after food intense pain came on, at a fixed position to the right of the umbilicus; there was occasional violent vomiting. It was evident that the intestine was at fault, rather than the stomach, liver, or gall-bladder, and it was supposed that some adhesion of the bowel led to these sudden onsets of severe pain. After a time she sank, and a portion of the jejunum was sent to me, presenting a circular ulcer to which the food had reached; this ulcer had induced the severe pain and the paroxysms of suffering during many years.

A few months ago a man was admitted into Guy's Hospital under my care, with severe fixed pain in the region of the sig-moid flexure, there was no local tenderness, no growth could be felt either externally nor by rectal examination. He told us that the pain was increased in severity whenever the bowels were

acted upon, and by careful elimination of other causes of fixed pain, it seemed tolerably certain that disease of the sigmoid flexure of the colon was the cause of the pain.   By carefully and gently acting on the bowels by the compound confection of senna of Guy's, by rest and regulated diet, the pain disappeared, but a sore on the side of the tongue increased in size, and presenting the evident signs of scirrhous disease of that organ, which tended to confirm the opinion that there was local disease of the sigmoid flexure of the colon, close to the brim of the pelvis, and at its junction with the rectum.

Diseases of the *liver* do not produce pain unless there be *disease of the surface* or *tension of the gland.*   Not so, however, is it with the *gall bladder.*   The mere presence of calculi in the gall bladder may induce spasmodic contraction and pain, but when the calculus passes into the duct or ulcerates through into the duodenum the pain is intense, and the symptoms acute and characteristic.

The same remark might be made with equal justice in reference to the *kidney,* unless there be tension of the capsule or disease of the pelvis of the kidney, no pain is induced; renal calculus, and its passage down the ureter, produce symptoms as characteristic as corresponding disease of the bladder.   It is well, however, to bear in mind that as long as the irritation be confined to the pelvis of the kidney, the pain may be quite circumscribed; there may be no vomiting, no pain in the course of the genito-crural nerve, but merely an occasional discharge of blood, possibly only recognised by the microscope.

Few of the abdominal organs induce fixed pain more constantly than the uterus in its varieties of displacement, of hyperæmia about the ovaries, and of local inflammatory disease; these fixed pains are most frequently situated at the position of the round ligaments, at the epigastric region, or at the sacrum.   The character of the pain, its position and attendant symptoms, indicate the nature of the disease, which is best relieved by restoring the uterus to its proper position, and by establishing its healthy function.

Abdominal tumours of various kinds, cancerous deposits, ovarian growths and cysts, produce fixed pains, but the signs are characteristic under careful examination.

We have briefly mentioned these causes of fixed abdominal

pain, but they are not the instances of disease to which we especially refer; and having eliminated these, we find other forms of disease which induce fixed pain, the peculiarity of which is that the patient is able to go about nearly as usual; the functional disturbance is comparatively insignificant, but occasionally the suffering is severe or intense.

The causes I have found to be—

1. Adhesions of an inflammatory character.

2. Chronic local inflammatory action, especially in the posterior part of the abdominal parietes, as at the quadratus membrane behind the cæcum or behind the kidneys.

3. A fixed position of the intestine, as when the transverse colon is more convex than normal, when the omentum is dragged down to the inguinal canal, or to the femoral ring, and when the sigmoid flexure slips down into the pelvis.

Adhesion and contraction of the omentum, the cause of fixed abdominal pain, afterwards of colic and of obstruction.

CASE 8.—A. B—, æt. 59, had enjoyed good health till a few weeks before his last illness, when severe flatulent colic came on, which was relieved by aromatic medicine. For many years, however, he had suffered from pain in the right side of the abdomen, when he fully flexed the thigh, as in cutting a corn, &c.

On May 31st he partook of some fruit in the evening; the bowels acted, but on the two following days there was severe darting pain across the lower part of the abdomen; aromatics afforded no relief, and purgative medicine was quickly followed by vomiting.

On the afternoon of June 4th there was considerable distension of the abdomen in the region of the cæcum; the distension was prominent, resonant, and it terminated abruptly midway between the crest of the ilium and the liver, but extended a little towards the right loin; there was spasmodic contraction of the muscular fibre, the pain was severe, but there was no tenderness; the tongue was furred and brownish, the pulse 108 and irritable, the hiccough was constant; flatus was passed repeatedly. A turpentine injection was used; chloroform and belladonna

liniment applied externally on spongio-piline ; and bismuth with morphia given every three hours.

On the 5th there was less hiccough and less spasmodic contraction, and no vomiting.

On the 6th the morphia was changed for Battley's solution of opium with ether, and a suppository of soap and opium (ten grains) was used at night. A full injection of warm water was used, and flatus, with a small quantity of mucus, was discharged.

On the 10th there was perceptible improvement; the urine was scanty and very deep in colour; the countenance and the conjunctivæ were semi-jaundiced; the pulse 104 ; the hiccough had continued with slight intermissions; the tongue was very dry and furred; thirst; no tenderness; occasional spasmodic pain; flatus was passed every day. He was ordered to omit opium by the mouth, to continue the suppositories, and to repeat a full injection of soap and water (three and a half pints were used).

On the 11th, during the night, and again at 3 p.m., a small motion was passed, the tongue was less dry, but the throat was deeply injected, the hiccough ceased for several hours, the urine became more free, and the pulse less irritable. A small quantity of borax was ordered, with syrup of tolu ; the suppositories and injection to be repeated. Ice to be applied to the abdomen. Fluid diet continued.

On the 13th there was bilious vomiting, which, however, became quite stercoraceous on the following day; the pulse then became weaker, 120. Flatus was passed, but it was quite devoid of smell. The opium was repeated by the mouth, and the suppositories continued, and an injection of linseed oil used, as the bowels had not acted again.

On the 15th the bowels acted freely, loose bilious action; the pulse was found to be very rapid and unsteady and compressible, 150.

On the 16th he sank, at 6 p.m., slight delirium preceding death.

The abdomen was examined on the following day. There was moderate distension of the intestines ; and the serous membrane was injected at the points of contact of the intestines, and presented some flakes of lymph. The cæcum and ascending

colon were much injected.   The omentum was contracted, and two bands of it passed across the ascending colon, firmly binding it down.   The flatulent distension of the cæcum and ascending colon had rendered this obstruction complete.   The mucous membrane of the cæcum was intensely injected, and presented small patches of sloughing mucous membrane.   This injection extended as far as the obstruction, and somewhat into the small intestines.   The liver, kidneys, spleen, &c., were healthy.

The adhesion of the omentum was in this case the cause of the fatal obstruction and inflammation, and it was also the cause of the pain which for many years had been felt in the region of the ascending colon.   It was quite evident that the cæcum and the commencement of the colon were enormously distended, and that the disease existed at this part.   Intussusception was at first thought probable from the local distension of the cæcum, imperfect resonance, violent peristaltic action, preceded by peculiar darting pain across the abdomen, and by the discharge of a small quantity of mucus; the frequent passage of flatus was also regarded as evidence of incomplete obstruction. The idea of intussusception was afterwards found to be inconsistent with the progress of the symptoms.   The inspection showed that the sudden distension of the cæcum led to traction upon the band of adhesion, and thus caused the obstruction, and that the greater the distension the greater the obstruction. The old pain at the part was referred to intestinal adhesion, but it was a double band of omentum which crossed the ascending colon.   Operative interference in the attempted division of the old constriction would not have availed for relief, nor would colotomy have been of service.   Opium in one form or other, and the distension of the lower bowel, were the means suggested by the inspection, and these measures had been employed.

This instance affords an explanation of some cases of obscure abdominal pain of long continuance, and it is generally by a process of abstracting other causes of pain that we are led to the correct diagnosis of these forms of disease.

Local peritonitis in the neighbourhood of the gall-bladder; adhesions; gastric symptoms; fixed pain; irritable mucous membrane; fatal hæmorrhage.

CASE 9.—A gentleman, nearly sixty years of age, had suffered from very severe pain in the region of the gall-bladder eleven years previously; there had been *no* jaundice, and it was doubtful whether the passage of a gall-stone had been followed by peritonitis. From that time there had been repeated attacks of pain; no blood had been passed; the bowels were generally constipated. The last attack came on six weeks before the fatal issue; there was nearly constant uneasiness below the scrobiculus · cordis, and occasional paroxysms of intense pain, with vomiting of clear frothy fluid; *no jaundice;* urine clear and healthy; the evacuations healthy in appearance. The pain was not connected with food, but distension of the stomach produced it, so also action on the bowels; it was below the position of the gall-bladder. The chest was normal; the pulse compressible; the tongue had a white fur; the pylorus could be felt; there was no tenderness on gentle pressure. Bismuth, opium, alkalies, silver, &c., failed to give any relief; but the hydrate of chloral at once relieved the pain. After a few days the pain returned, and the frequent repetition of the chloral soon produced distress. Belladonna and chloroform externally afforded temporary alleviation, but when freely applied the pupils became widely dilated, and the ejected matters smelt strongly of belladonna.

The stomach was now allowed to rest as much as possible, asses' milk only being given by the mouth, and nutrient injections employed. The vomited matters became coffee-ground in character; blood was detected by the microscope. On the following day, ten days before death, there was sudden faintness, blood was vomited in considerable quantity, and several pints of black tarry liquid were passed from the bowels. The pulse became unsteady, but the mind retained its consciousness. On the following day black motions were passed. The acetate of lead appeared to be of service in checking the hæmorrhage. For five days there was improvement, but again there was a sensation of weight at the chest, faintness, coldness in

the back; eight to ten ounces of fluid-like coffee-grounds were vomited; actual syncope took place and slight convulsive movements. This attack was at about half past six in the evening, and at midnight he had rallied; he became conscious; the pulse was steady, but very compressible; the surface of the body was warm; and the pain had left him. On the following day he was better, but on the next day he was again very prostrate and blanched, and in the afternoon he became very restless and nearly unconscious. The next attack of hæmorrhage on the succeeding day led to fatal syncope.

Inspection was made thirty-six hours after death. There were old and firm adhesions between the liver, stomach, colon, and duodenum. The liver was normal in size, partially decomposed, but healthy. The gall-bladder was healthy; it contained five irregular small calculi; the ducts were free. The mucous membrane of the *stomach* was emphysematous; it contained some blood. There was no evidence of ulceration, but hyperæmic patches of membrane; the pylorus was healthy; the duodenum was healthy, but there was some congestion of its membrane. The jejunum contained some grumous fluid, and there were a few patches of superficial abrasion. The mucous membrane of the ileum and Peyer's glands were stained. The cæcum and colon contained large quantities of black tarry matters and some fæcal masses; the mucous membrane of the colon presented numerous minute depressions, with well-defined margins, one sixteenth of an inch in diameter, as if there had been old follicular ulceration. The mesenteric glands were healthy. The spleen was normal; the kidneys pale, and somewhat atrophied.

Gall-stone, and the local peritonitis which followed, had led to firm intestinal adhesions; and these adhesions so far interfered with the movements of the stomach and transverse colon that whenever there was any distension of either viscus pain was produced. Thus, spasmodic contraction of the pylorus was brought on, and vomiting after food, and when the bowels were acted upon the movements of the transverse colon also produced pain. *Any tension upon the adhesions caused pain.* It was deeply seated and constant in position, but there was no tenderness on pressure. The hæmorrhage from the mucous membrane of the stomach and small intestine was the cause of

the fatal prostration and syncope; some patches of congestion and a few points of superficial abrasion were found, but there was no well-marked ulcer. This instance strikingly illustrates the pain that is produced by old adhesions. There was no evidence that the small gall-stones had moved from their position, or had at all impeded the ducts.

Gall-stone; abscess; calculi discharged through the abdominal parietes; subsequent local abdominal pains; recovery.

CASE 10.—Mr. —, æt. 60, came to town in February, 1869, and the following history was given to me. The general health had been good till eight years before, when he had severe pain, which was attributed to gall-stone, but there was no jaundice. For two years there were symptoms of indigestion, but the health improved. In September, 1866, there was again some biliary derangement. In May, 1867, after a dinner party, he was seized at midnight with violent vomiting; he was purged, and the following day was almost in a state of stupor; the pulse was quick, the tongue dry, the urine was free from albumen. These severe symptoms subsided, but in a month's time there was pain at the lower margin of the liver and enlargement. Rigors came on, and the swelling became more tender. It was feared that there was abscess of the liver. About June the swelling began to " point," and at length fluctuation was felt, and a puncture was made. A considerable number of biliary calculi with green fetid pus were discharged; the calculi had facets on their surfaces.

In September other calculi passed, and in October there was a small sinus, which yielded a thin discharge like white of egg, and a probe could be passed for two inches. The sinus afterwards closed, and the general health improved. In November, 1867, he went to business; in April, 1868, he had a " bilious attack," and in June he had symptoms of dyspepsia. On June 18th he was seized at night with vomiting of grumous blood, like coffee-grounds. There were no black motions. He had some pyrosis, and as he continued in a weak state of health he went to the seaside. Uneasiness after food and vomiting came on, and shooting pain in the back.

He continued to lose flesh and strength, and became very

prostrate. In February I found him greatly emaciated. During the last three weeks he had had several attacks of vomiting; large quantities of mucus had been vomited in the evening. The bowels were regular, but their action afforded relief to the vomiting; the tongue was clean ; the pulse 56, of fair strength ; the abdomen was supple, except in the region of the gall-bladder, where there was a cicatrix, and where there was evident thickening, giving the idea that the duodenum and colon were adherent to the transverse colon and to the stomach. Castor oil was given to act on the bowels, and ℔xx of solution of morphia three times a day. It was found that whenever the bowels were constipated, or the stomach was distended by flatus, pain was produced. The gentlest aperients were used, and bismuth with hyposulphites employed, to check the flatulence. Careful attention was given to the diet and to the avoidance of fatigue. Improvement gradually took place. He was soon able to get out, and thoroughly regained health. Once or twice there were severe spasmodic pains in the region of the gall-bladder, but they could generally be referred to some indiscretion in diet.

Gall-stones in this case had set up intense pain. The calculi did not pass into the common bile-duct, and consequently no jaundice was produced. Inflammation of the gall-bladder followed and abscess, which ultimately reached the surface, and formed an outlet. The calculi were discharged, and the resulting sinus after a time healed. It was evident that local peritonitis was produced, and that the adjoining intestines and viscera were fixed together. These adhesions were the apparent cause of the subsequent pain ; both the *stomach and transverse colon were limited in their movements, and whenever the one or the other became distended pain was the result.* As long as the bowels were fairly relieved and flatulent distension of the stomach was prevented there was immunity from pain and eructation. It seemed probable that the gall-bladder itself was quite destroyed.

Old peritoneal adhesions are often the cause of pain where the omentum has become adherent in hernia, and produces traction upon the transverse colon and the stomach ; so also when the small intestines become fixed in their position, whether adherent to each other or in the pelvis. Sometimes the sigmoid

flexure will be united across the abdomen to the cæcum, and pain is then readily induced by increased tension of the parts. We must carefully distinguish between the pain produced by movements or increased tension of any part from the pain which accompanies digestion, and which is the consequence of ulceration of the mucous membrane.

Dysentery in China; chronic irritation of the colon; deep-seated pain behind the spleen; abscess; effusion into the chest, and death.

CASE 11.—A. B—, aged 50, had suffered from fever and dysentery in Hong-kong, twenty years previously.   In October of 1868 he had pain to the left of the umbilicus; the pain gradually increased in severity, and sometimes became severe. On June 12th, 1869, he complained of pain in the back, but there was no local tenderness, there was no vomiting, nor was the pain in the abdomen worse after food; the urine was normal, and free both from albumen and sugar.   There was flatulence, and although the patient slept well pain came on about four or five in the morning. The abdomen was contracted and no enlargement nor tumour could be felt.   The patient was fairly nourished, and was able to take outdoor exercise. The pain in the abdomen was relieved by gently acting on the bowels, and by carbolic acid and bismuth for the flatulent distension, but on the 28th he began to complain of pain under the left ribs; it steadily became more and more severe during July and August; still, nothing could be found on careful manual examination.   On September 8th he was able to take a railway journey to town.   The pain was constant and fixed, it was situated deeply at the extremity of the tenth rib, and was relieved by the action of the bowels.   Other anodynes were employed, and hypodermic injections used without relief. The doctor under whose care he was in the country afterwards informed me that a swelling formed in the loins, fluctuation became distinct, offensive pus was evacuated, and that acute effusion into the pleura took place.   The patient died on November 23rd.   In this instance there had been old disease of the colon many years previous to his fatal illness, but disturbance of that part was soon relieved.   The pain was located above the

situation of the colon, and near to the posterior and inner aspect of the spleen, and arose from local inflammatory disease, but how it originated is still uncertain. The urine was normal, and there was nothing to connect the disease with the kidney, nor was there any evidence to show that the abscess communicated with the colon; the pus was not feculent in character. We have observed several instances of abscess in the neighbourhood of the quadratus lumborum and of the lower ribs in which the patients have recovered; these conditions are always most obscure at the commencement, and especially so when the pain is at the anterior part of the abdomen. Many years ago, when I had the advantage of being clinical clerk to my late colleague, Dr. Hughes, a man between fifty and sixty years of age, was admitted with fixed pain at the anterior margin of the spleen. The pain was most persistent, but was generally relieved by a blister. He left the hospital and returned with the same complaint of fixed pain. Death resulted from other disease, and it was found that a dense patch of fibrinous deposit, the size of a crown piece, behind the spleen, had involved the branches of the nerves, and had produced the pain. It had resulted from local inflammatory disease at that part.

The *third* cause of fixed abdominal pain to which we adverted is displacement of viscera; the cæcum is sometimes rotated upon itself, and in not a few instances we have found that the sigmoid flexure bends over the brim of the pelvis, and forms almost a right angle. This condition is more frequent in advancing life; it induces uneasiness in the iliac region, it aggravates constipation, and sometimes causes even fatal obstruction.

We have brought forward these instances of fixed abdominal pain with the hope that they may assist in the elucidation of some obscure and troublesome complaints.

One other malady we have intentionally refrained from mentioning, namely, the neuralgic pains often associated with ill-developed gout. Besides the dangerous disease designated " gout in the stomach," there is an uncertain abdominal neuralgia which becomes most distressing to patients affected with gouty dyspepsia. In these cases gout may aggravate the severity of the affection, but it will be found, when thoroughly investigated,

that there is some local origin of the kind we have described. It must, however, be always remembered that the state of the nervous system modifies the severity of pain, so that a *local source* of disturbance which at one time or state would produce *no* recognizable symptom, at another may be the cause of severe suffering.

ON THE RELATION

CHEMICAL DECOMPOSITION AND NUTRITION.

By JAMES HINTON.

My attention has been drawn to the question which heads this paper by my having become unwillingly involved in a controversy as to the origination of the view that the motor power in nutrition is chemical decomposition. Dr. Waters, of St. Louis, in America, on the one hand, claims to be the first propounder of this thought, and Dr. Freke, of Dublin, on the other, affirms his priority. Between them I am not competent to decide, though I am of opinion that both claims are practically just; Dr. Waters' statement being full and complete, but later; Dr. Freke's being earlier, but more indistinct, and perhaps capable of more than one interpretation.[1]

Dr. Freke says, " We find the living atom has imparted its organic properties to the inorganic matter, and in parting therewith has itself become inorganic." Dr. Waters, and others after him, trace out in express dynamic terms the process as they apprehend it; namely, that in the decay of one portion of organic matter force is set free, which acts as the " organizing " force of other matter, either causing it to become organic (having previously not been so), or raising it from a lower to a higher vital state. It is in respect to the true order of ideas

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[1] ' On the Origin of Species by means of Organic Affinity.' By H. Freke, M.D., &c. London: Longmans. 1861. P. 48.

here that I wish to say a few words. Which is the true thought:—Does the first organic matter " impart its force," and thereupon decay? Or does it undergo decay, as representing a " tendency" of the elements, and so come to impart its force ?

There is no doubt that, with our accustomed ideas of the properties of matter, the latter is the view into which. we most readily fall. But on reflection it by no means appears clear that it is the true one. Granting an " inherent chemical affinity," leading, *e.g.*, oxygen and hydrogen to combine into water, there would be a certain natural order in beginning with it. But this conception is one which science now repudiates. The tendency of oxygen to combine with hydrogen is not an inherent property, it is determined by antecedents, and depends on relations apart from those elements. Decomposition, we know, will not take place except under certain conditions. Now, when vitalization of another portion of matter ensues upon such decomposition, may not the possibility of this vitalization be precisely the condition which allows or determines the decomposition ? Let me take what I consider an analogous case. In a heated body, let me suppose (I think it is in such sense true as to serve the purpose of the illustration) there is a tendency of the particles, which the heat has separated, to approximate to one another, *i.e.* a tendency of the body to contract (on cooling). But this contraction cannot take place if the heat cannot be radiated. The condition for the contraction is that there shall be some body to which the expansion-producing (or the contraction-controlling) principle (the heat) can be passed on— some cooler body, in a word, within a certain distance. As the one body expands the other contracts ; but which comes first, the contraction of the cooling body, or the radiation—the transit —of the heat ? To me it seems that this question goes deep into the most recondite questions of molecular physics; but in the representation of vital action as " produced by" decay, is it not quietly assumed that the cooling, or contraction, stands as cause ?

I grant that when we take parallels of another sort, as *e.g.* a clock moved by weights, the order seems simple enough. The hands move, &c., *because* the weights fall, and the weights fall because of their gravity, and so on. But we must remember there is no gravity except as a result of conditions. Will the

weights fall if the hands cannot move? Or take the simpler. case of the balance. Suppose it in equilibrium ; two changes will equally set it in motion, increase or diminution of weight in one scale. The raised condition must be imparted—transferred— or it cannot cease. It may be said, indeed, sever the connection of the scales, and the one will fall and the other will not rise ; but something else will rise, or undergo some change equivalent to rising. The law is not altered, but only its particular application. The fall is seen, while the rising escapes our vision. We must be on our guard here lest the particular character and limitations of our experience deceive us, bringing, as it does, before us so preponderating a number of instances in which the downward process is the prominent one, the upward secret or out of reach.

But that the order of our experience must not be relied upon is evident from the fact that it differs in different cases, and in each produces on our minds the same impression, although mutually contradictory, of "natural tendencies," and of the beginning being in reality where it seems to be. So from the inorganic world we derive, from preponderance of instances, the impression that the downward process comes first, and we suppose gravity, chemical affinity, and so on accordingly. But from the organic world we receive the impression of the correlative, or upward, processes coming first ; the decay is hidden ; there is the seemingly spontaneous vitalization, warmth, activity. Accordingly we have invented life, or vital force, as a primarily existing power. But in what respects do these two classes of ideas differ? On what firmer basis stands gravity than vitality —chemical affinity than the "organizing influence"? In each case we have simply put up as a first thing what comes first to us, what our particular relation to the series of phenomena suggests as primary or as the starting-point.

Now, doubtless these two opposite conceptions have to be brought into harmony, and here appears to me to be one chief value of the recognition of the connection between nutrition and decay ; it brings into unity our fundamental conceptions in respect to organic and inorganic nature. But let us observe : this unity is obtained through interpreting the organic by the inorganic. Doubtless the phenomena may be marshalled intelligibly (up to a certain point) in this order. If we assume

the unintelligible points in the inorganic world as granted, we may bring the phenomena of life into unity with its phenomena; but then we must remember that we do assume these unintelligible data. We are haunted still by those dim ghosts of gravity and chemical affinity and the like, and listen in vain for the cock-crowing that is to banish them. I do not know, indeed, that the flash that seemed to promise so fair an illumination does not make the darkness around us more painfully visible.

But perhaps there is a different plan. We try interpreting the near, the better known, the living world, by that far off, dimly apprehended one, which we call dead, and we find that to a certain point we can succeed. But if we can succeed *so*, cannot we succeed also the other way? How if we could interpret —they being proved the same—the dead by the living? May not the vital force, after all, give us a better key to chemical affinity than chemical affinity gives to vital force, and leave us finally not standing spell-bound before a *caput mortuum* of inconceivable attractions and repulsions, but face to face in presence of a power plastic to the intellect and cognate to the soul.

Let us for the present avoid, or at least defer, the phenomena of gravity, not denying, in the mean time, that they present special difficulties. But it seems to me that from the point of view above suggested the phenomena of the so-called chemical affinity appear in a fresh and less hopeless light. Take, on the one hand, oxygen and hydrogen, and on the other water. It is evidently an incomplete statement to say that the latter "consists of" the former. An essential part of the phenomena is thus ignored. For oxygen and hydrogen will combine and form water only on the giving out of a large quantity of heat, *i.e.* of *force*. The two gases are water *plus* force, and water represents the gases *minus* force, for they cannot be obtained from it except by the addition of the same amount of force that they gave out in uniting.

Now, this relation which exists between oxygen and hydrogen in the form of gas, and their equivalent of water, evidently is traceable throughout the entire domain of chemistry. In relation to chemical phenomena, all substances may be classified in one of two groups—as having force present with them, or as not having it. Not that such classification perhaps ever ceases to be relative; but it is, for this reason, none the less real. For

example, oxygen and sodium contain force, which soda does not; so, too, carbon and oxygen contain force,which carbonic acid does not; but soda and carbonic acid contain force, which carbonate of soda does not. But I take it that neither this relativity nor any doubtful points of detail in the least degree obscures the general distinction; which, indeed, in a more limited scope, has been laid down by Professor Graham as obtaining between the crystalline and colloid groups, and which is obvious enough as between hot bodies and cold ones, charged and uncharged non-conductors of electricity, and so on. We take, then, water on the one hand and oxygen and hydrogen on the other to stand to us as representatives of the whole domain of chemistry. Considered substantially, they are one; the water expresses the condition of the substance *without* (a certain kind and degree of) force; the gases present the same substance *with* that force. Now, what is the simple statement of the phenomena given in the formation of water? This surely: under certain conditions (say an electric spark coming into relation with the gases) the force is " transmitted," ceases to be in them, and begins to be in something else, and coincidently the substance is found in the condition which it has in the absence of the force (water).

Here arises evidently the same question as that which I raised before: which comes first in thought-order, the transmission of the force, or the alteration of condition of the substance? Is not the balance of reason on the side of the former? To say of force that it is transmitted or transmits itself, what is it but to say that it is force—that motion is motion, and exists in its movement? It is the nature of motion to be transmitted to whatsoever that is capable of moving comes into relation with it. That force should be transmitted at whatsoever opportunity occurs is but saying in other words that motion takes the direction of least resistance.

Our thoughts may be helped here by referring to another form of chemical process—the galvanic current. Chemical action, as we say, is set up on union of the poles; but what is the union of the poles but making a passage for the " easier transmission of force"; in a word, presenting a direction of less resistance? Then, when the force which is in the zinc and sulphuric acid can be transmitted, the substance presents itself in the condition which it has in the

absence of force (sulphate of zinc). Now, are not the production of water on application of an electric spark and the production of sulphate of zinc on union of the poles of a battery analogous dynamic processes? Is not the presentation of a direction of less resistance to the force the determining moment in each instance, and is not this change in the relation of the force the true dynamic process?

If so, then what follows is, that we have no need to assume any chemical affinities; the apparent change of substance is a passive phenomenon; it expresses simply the law that force cannot at once be and not be in the same place.

I would add only, in respect to life, the question, whether the "conditions of decay"—the heat, moisture, air—be not rather, in truth, the conditions of the transmission of force. Then, when the force is transmitted, whether to the surrounding air, as heat, in which case no life results, or to other particles, making them living, alike decomposition ensues; the recurrence of the state in which the force thus transmitted is no longer present.

ON

THE NATURE OF ATHEROMA IN THE ARTERIES,

WITH A

DESCRIPTION OF A REMARKABLE CASE OF ARTERITIS.

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By W. MOXON, M.D.

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THE relation of inflammation to arteries is one of the least satisfactory chapters in our present pathology.

Nothing is more common, and nothing of more serious importance, than arterial disease. The causes of apoplexy, softening of brain, aneurism, senile gangrene, &c., sufficiently show the gravity of the results of these diseases.

The word atheroma is guilty of a large part of the uncertainty and confusion that obscure arterial disease. This word is practically used as if it signified nearly all the spontaneous or primary changes that arteries are subject to. Now, in this country at least, the word atheroma carries with it a meaning of degenerative rather than active changes. So lately as 1869 Sir W. Jenner, when recounting before the British Medical Association the advances of modern pathology, enumerated among its stages the discovery that the changes in arteries included under atheroma are of a degenerative and not of a more active kind.

It must be allowed that this opinion rests upon a basis of evi-

dence that is sure to arrest attention, for the appearance of atheromatous arteries observed by the unaided eye, or with such aid from the microscope as is easy of employment (I mean the examination of the soft yellow matter of the atheromatous patch), gives plain proof of the disorganized and degenerated state of the vessel's wall, in the conspicuous yellow faded-looking patches, accompanied in graver states by a stony layer or a soft matter made up of the common products of tissue-degeneration, namely, granules of lime and fat, shreds of tissue, and cholesterine plates.

So common and extensive, and so varied in their appearances, are these changes, that they cover, as it were, out of sight all other kinds of arterial disease. And in even our latest works on surgery and medicine atheroma and aneurism occupy a large share of attention, the former being described as a degenerative change. On the other hand, arteritis generally receives only a very cursory and general notice of a few lines' extent, the tendency of which is to make arteritis seem to the student to be a rare and remote and strange occurrence, quite distinct in its pathology from atheroma.

I believe that, so far from this being the true view, atheroma is in continuity with arteritis, and graduates from a condition in which no inflammatory results can be found into one in which inflammation is unmistakably present, in the same way as hepatic capsulitis may be a mere slight thickening continuous practically with the normal nutrition, or may by insensible degrees become a layer of recent lymph with symptoms of inflammation.

Various present views of arteritis and the atheromatous process.—Passing by older views, and looking only to the current literature and especially to current teaching, let us see what are the views held concerning the atheromatous process.

In Holmes's ' System of Surgery' the writer[1] on this subject describes the change as a thin, soft, clear membrane laid down out of the blood upon the inner coat of the vessel. This lining grows adherent to the vessel's wall, and other layers cover it, while these layers together become dull and opaque and acquire the appearance of ligament. By the presence of these layers

[1] The late Mr. Moore, whom one cannot mention without a tribute of respect for his memory.

the proper coats, their functions destroyed, change and waste. Then the adventitious layer goes on to soften or petrify, and the weakened coats of the vessel are made by it to inflame. In particular it is the outer coat that inflames. The fibrous (middle) coat becomes fatty and wastes.

With this view of the anatomy of atheroma the occurrence of the layer which commences the process is set down to a morbid blood freshly charged with oxygen, an opinion founded chiefly on the immunity of the venous system from the change. On the other hand, the writer on aneurism,[1] who regards this as in the great majority of cases the result of atheroma, leans to an opinion as to the origin of atheroma directly opposite to that of his colleague, believing that the immunity of the venous-blood-circulating vessels is due to the weaker mechanical strain thrown on them.

Of inflammation of the arteries very little is said ; it appears to occur in the aorta sometimes, from cold, and occurs as a consequence of embolism.

Atheroma, then, is here viewed as a deposit, and though inflammation is recognised this is declared to be secondary, a late result of the process.

Mr. Paget (ed. 1863, p. 107) regards the atheromatous process as entirely of a degenerative nature, and places it in the more or less developed muscular or transversely fibrous coat. He makes no mention of any inflammatory results, and has a leading regard to the occurrence of fatty degeneration in microscopic vessels.

Mr. Erichsen (ed. 1869, vol. ii, p. 1) describes arteritis at some length as extensive or limited and diffuse or erysipelatous. ·In the first the external coat becomes pulpy and vascular, with effusions of lymph in it ; the middle coat wastes subsequently, but the inner coat softens and is stained by imbibition, the whole thickness of the vessel becoming brittle, and meantime layers of fibrine forming within, or else a plug filling the vessel, the plug " composed of inflammatory exudation-matter intermingled with fibrine deposited upon it by the circulating blood and adhering firmly to the contiguous walls of the vessel." These plugs are called embola, whether formed in the part, or conveyed from a larger artery or from the left heart on into a smaller vessel.

Notwithstanding that one drawing of " plastic deposit "

[1] Mr. Holmes.

(surely fibrin-clot) in the aorta is given, all this appears to correspond with the changes observed in smaller arteries in thrombosis and embolism, but Mr. Erichsen does not distinguish between thrombosis (formation of clot *in situ*) and embolism (conveyance of clot into an artery). His description of the plug of clot in the artery as composed of plastic matter poured out at the inflamed point is very contrary to modern views. There is no evidence that inflammatory exudations pass into the channels of arteries from their walls, and his diffused arteritis, which he describes as redness of deep claret colour, would now, I think, be regarded by pathologists unanimously as only post-mortem imbibition from decomposing blood or blood whose corpuscles are disintegrating.

His notice of arteritis does not state any relation of this to atheroma, but in the account of atheroma, after describing this as proved by Gulliver to be fatty degeneration of certain of the proper coats, with thickening of the outer cellular coats, he says, " All those theories are consequently erroneous which attribute atheroma to previous inflammation, to suppuration, or to a deposit *sui generis* in the artery." No evidence beyond this assertion is given of the absence of inflammation in the early stages of atheroma, which, on the other hand, is described as occurring sometimes in plastic deposits on and under the inner membrane of arteries, yet plastic deposits are commonly connected with inflammation.

The distinctive features of Mr. Erichsen's teaching, then, are that he views the fibrinous plugs in arteries as all or part inflammatory exudation, and that he denies the association of arteritis and atheroma. Now, as he describes only atheroma as the disease of the arterial coats that leads to aneurism, it seems clear that by atheroma, which he thus says is non-inflammatory, he means all those deforming changes of the inside of large arteries that go with aneurism, and all he says of arteritis does not militate against this, as the arteritis he describes is the result of injury or near neighbouring inflammation.

Dr. Aitken (5th ed. ' Scientific and Practical Medicine ') places atheroma as a fatty degeneration of the aortic coats, not stating any relation of it to inflammation. He describes aortitis in the following way :

" The post-mortem appearances of true aortitis are great

vascularity, and especially of the vasa vasorum, a thickened and pulpy state of the inner and lining membrane, which, having lost its glistening aspect, has a villous, rugous, or granular aspect. Lymph may be seen on its surface, and slight excoriations or superficial ulcerations may be observed here and there. The elasticity of the vessel no longer exists, so that rupture takes place very readily. . . .

"A murmur is appreciable, a loud, rough, systolic bruit, due to the passage of blood over the rugous and unpolished state of the inner membrane (Gendrin, Parkes).

"*Causes.*—Rheumatism, gout, and syphilis seem to have a decided influence in the development of this disease."

Dr. Aitken does not mention atheroma as leading to aneurism, but is much impressed with the tendency of syphilitic cicatrices to produce aneurisms. This question we will shortly consider. Dr. Aitken's teaching may be noticed as making conditions that are usually inflammatory and active to be the main causes of aneurism. Now, all agree that these main causes which are seen deforming the arteries in aneurism cases are what is known as atheroma. So that Dr. Aitken's view practically amounts to a belief that much of atheroma is syphilitic or other cicatrix, and so is inflammatory. But he does not say so.

Dr. Reynolds's 'System of Medicine' as yet only incidentally deals with this question, but in describing the formation of minute aneurisms in the tissue of the brain Dr. Bastian mentions the increase of connective tissue in the outer coat and the fibrous change of the middle coat, these being changes that are of the same kind as the results of inflammation. The subject of atheroma is not yet reached.

Dr. Wilks ('Path. Anat.') describes acute arteritis as generally due to near neighbourhood of active inflammatory disease. He views chronic arteritis as common, but looks upon atheroma as degenerative, and does not mention any connection of it with inflammation, tracing its earliest commencement, as Mr. Erichsen does, to the slight yellow fatty patches seen in the aorta in nearly all who have passed early childhood. However, Dr. Wilks regards the thickened patches of artery seen between atheroma patches in cases of bad arterial disease as of inflammatory nature.

From this review of the teaching of the principal text-books on the subject it is clear that in this country no connection between atheroma of artery and inflammation of the arterial coats is admitted; it is commonly directly denied.

I think, too, that these extracts justify me in saying that an importance and frequency of arteritis as related to atheroma is not asserted or hinted at. The test by which this can best be shown to be true is the answer which these several pathologists gave to the question, what is the cause of aneurism? This is always said to be chiefly, if not only, atheroma; and when gout, syphilis, alcoholic drinks, &c., are thought to have influence in causing aneurism, it is through the medium of atheroma that they are thought to do so. From this we must conclude that the states of the vessels that precede and accompany aneurism make up what is meant by atheroma in the meaning of these authors. And, using another means of ascertaining the general acceptation of the term, we find that in nearly all descriptions of post-mortem examinations the word atheromatous is used to describe the defaced interior of arteries as commonly seen in people of middle age or older. An exception to the above general statement concerning the published views of the causation of aneurism is in the case of Dr. Aitken's work, which, as I have already said, in speaking of aneurism, gives syphilitic disease producing scars of the inner coat as a main cause of it, so that, no doubt, in his view the defaced interior of aneurismal arteries is seen as syphilitic arteritis. But there is this omission, which, unfortunately, obviates a clear apprehension of the relation of his view to that of other teachers—that he nowhere describes atheroma of the arteries, and it is only by inference that one concludes that much of what others call atheroma he calls syphilitic arteritis. Dr. Wilks, too, holds the importance and frequency of arteritis, though keeping it sharply apart from atheroma.

If now we turn to consider the teaching current on the Continent concerning atheroma, we shall find a very opposite view of its nature to be held. No doubt this is chiefly due to the teaching of Virchow, but the names which could be cited in favour of the same view are not such as one would suppose to be led by mere authority, and Virchow's pathological views have been long before English readers in the form of Dr. Chance's trans-

lation of his celebrated work on 'Cellular Pathology,' without having made much way towards that general acceptance which on the Continent they meet with. To take as an example Niemeyer's account, he says (vol. i, p. 345, American translation) :

" The alterations which cause insufficience and constriction of the aortic valves are the result of inflammation, but less often of endocarditis than of a more chronic form of inflammation which attacks the arteries, and whose results are known as *atheroma of the arteries.*"

And further on :

" The reason for classing the gelatinous and semi-cartilaginous thickening of the inner arterial tunic, which forms the incipient stage of ossification and atheroma of the arterial walls, among the parenchymatous inflammations, is due to the fact that in this disease we undoubtedly have to do with an active process, with generation of cells, and that in many cases it can be shown that these nutritive disturbances owe their origin to certain irritants which have acted upon the tunics, as undue strain, or distension (see Pathology of Endocarditis). In other cases, indeed, it cannot be proved that the arteries have been subjected to special irritants; as, however, the anatomical changes are precisely the same, we may assume that the sources of irritation exist, but have escaped our observation.

" *Endarteritis deformans,* as we may call chronic inflammation of the intima, according to Virchow, is an extremely common disease of advanced age ; and it is always at the points most exposed to strain or distension, such as the ascending portion and arch of the aorta and the places of origin of the vessels which pass off laterally, that the disease is most apt to occur. In the second place, the malady is most frequently found to affect gouty, rheumatic, or syphilitic persons, as well as drunkards. We are not at liberty, however, to go so far as to suppose that in these cachectic subjects the disease proceeds from the composition of the blood, that an irritant circulates in the latter which excites the internal coat of the artery to the point of inflammation."

The description Niemeyer gives is partly condensed from Virchow, whose account of the process of atheroma, in the ' Cellular Pathology,' is extremely interesting. Virchow argues

the inflammatory nature of the process chiefly from the prolifera-
tion of the connective-tissue-cells in the inner coats (trans. by
Chance, p. 361):

" The enlargement which the part undergoes in consequence
of the process, and which we call sclerosis, depends upon this :
the cellular elements of the coat increase in size, and a multi-
plication of their nuclei takes place, so that spaces are not un-
frequently found in which whole heaps of nuclei are lying.
This is the mode in which the process sets in.   In many cases
division occurs in the cells, and a great number of young cells
are met with.   These afterwards become the seat of the fatty
degeneration, and then really perish.   Thus we have here an
active process, which really produces new tissues, but then
hurries on to destruction in consequence of its own develop-
ment."

If we turn to the description of Billroth (Vienna), his de-
claration of the inflammatory nature of atheroma is explicit
enough ('Pathol. Chirurg.'):—" The atheromatous process which
came under the form of an enclosed ulcer has ended by pro-
ducing an open ulcer with undermined edges; you see that the
mechanism is the same as that which we are already acquainted
with in the skin and lymphatic glands.   It is a chronic inflam-
mation which ends by caseous change, or by formation of
atheroma, as they call the pulp in question."   This declaration
follows a very careful and precise description of the cellular
and fibrillar augmentative changes in the inner coat of the
artery.

It is worth noting that whereas Virchow, Billroth, and others,
reach the view of the inflammatory nature of atheromatous
change from this behaviour of the cellular elements, Dr. Wilks
arrives at a conclusion which, I think, is practically quite the
same in a different way.   He describes ('Path. Anat.,' p. 104)
local chronic arteritis thus :—" The most important place for
this to occur is the aorta, especially the arch, where the indura-
tion and loss of elasticity is attended by impairment of function,
leading sooner or later to death, and this is called *aortitis.* Thus,
you will see in this specimen that all the coats of the ascending
aorta and arch are exceedingly thickened, the external cellular
coat is changed into a tough fibrous tissue, and the middle coat
is also very much increased in size; the alteration from the thin

normal texture of an aorta is very remarkable, the vessel feeling rather like a piece of leather."

Now, such changes as these are commonly present along with the atheromatous pulp in the deep inner coat. *And these are part of the changes that go by the term atheroma as commonly accepted.* So that Dr. Wilks, though not recognising the atheroma as inflammatory, recognised as inflammatory its accompanying condition, which really is only a rather more inflammatory condition than atheroma, and graduates imperceptibly into it, and, no doubt, precedes it. He thought this accompaniment of atheroma to be inflammatory from the alterations visible to the naked eye, the coats being changed to a fibrous tissue, and appearances corresponding to this are very common in a bad atheromatous aorta. Dr. Wilks, indeed, says so; thus, speaking of atheroma (p. 105)—"In these extremely diseased aortæ you may see raised patches of much firmer consistence, which, when examined, are found to consist of a fibrous tissue; this results, probably, from a chronic inflammation of the coats of the vessels I have just mentioned."

Hence we may say that Dr. Wilks's view only differs from Virchow's in his not showing that the fatty change that makes the atheroma pulp is a result of the inflammation which he affirms to accompany the atheromatous change.

I have shown that in this country the inflammatory nature of the process that in general here goes by the name of atheroma, is not taught, and yet I believe that the Continental view which regards this process as truly of an inflammatory kind is correct. So that when a little intensified the atheroma cause becomes a real inflammation, with obvious lymph-products.

It becomes important to inquire the reasons why this obscurity and misapprehension prevail. I think the following reasons will serve to put the difficulty in a clear light.

1. There is a superficial fatty degeneration of arterial lining membrane, which has about it no formation of plastic matter and no change of the coats of the vessel. And this is easily and naturally regarded as of the same nature as the more deep-seated fatty destruction, accompanied by swelling and alteration of the coats, although this latter is really a very different thing.

2. Fatty degeneration is commonly set in opposition to inflammation, so that the former, when present, appears to set the

latter aside, although, in truth, fatty degeneration is in some tissue-elements a normal result of inflammation; witness the fatty change in muscle under the pericardium in acute pericarditis, the fatty stage of chronic Bright's disease, the fatty changes in the pulmonic exudation-cells, &c., &c.

3. The more definite and easily described and recognised fatty changes have led to a common ignoring of the other changes that *always* accompany these fatty deposits. Yet where the deep layer of the inner coats shows considerable fatty change in any patches of an artery there will nearly invariably be found other patches, more numerous, where the colour is altered from the natural yellowish tint to a bluish, starch-like, subpellucid appearance, while the substance has lost its elastic supple firmness, and become more flabby and soft, though thicker; changes which the microscope shows to go with a presence of corpuscular formation in the coats and commencing wasting of the elastic and muscular fibres.

4. The indistinct nature of the inflammatory product in the coats of arteries, which is a pellucid layer apparently added to the lining membrane on its inner face, or in its deeper part, the likeness of this layer to the proper inner coat being an instance of the assimilation of new products to the nature of the part in which they are produced. This indefinite nature of the inflammatory product may be compared instructively with—

5. The ignorance and doubt that even now prevails as to the nature and mode of nutrition of the inner arterial coat in its normal state. Is it formed from the blood that flows in the vessel? Is it naturally covered within by such a deposited formation? I believe it is so formed. The kind of evidence on which this is based is well illustrated by a case read to the Medical and Chirurgical Society by Dr. Fagge ('Med.-Chir. Trans.,' vol. lii). I had an opportunity of seeing the aorta in this case, which was that of a gentleman who had probably ruptured the proper coats of his aorta six years before his death. The blood had made its way between the *media* and *externa*, down the thoracic and abdominal aorta, creating thus a new false aorta, that made, with the original and still pervious one, a pair of tubes very like a double-barreled gun, the false channel re-entering at the iliacs on each side. Now, it was remarkable that the false aorta had as good a lining as the true one, as

smooth and of the same pellucidity; and the likeness was carried further by the presence in this false *interna* of fatty degeneration-spots like those in real aortas, so that one could by no means tell which was the false and which the true aorta by examining the inner surfaces, but only by studying the coats and relations to rising branches, when the real one could be made out certainly.

6. Lastly, theoretic considerations of very long standing and with very great weight of authority on their side have widely spread the belief that non-vascular structures cannot inflame. There is more than authority in favour of this idea, for since the clinically observable phenomena of inflammation are largely the work of the vessels, nay, perhaps, solely the work of the vessels, it is very difficult for those who have mainly a clinical view of inflammation to think of inflammation without vessels-action; it is like the thought of combustion without fire. *Eremacausis* is an idea we have to be trained to appreciate. Now, it is matter of regret that hitherto the idea of *inflammation as a phenomenal product of vessel- and nerve-action* due to active changes in the elemental cells of parts has not received popular attention and acceptance. Yet there can be no question that inflammation is truly a set of secondary phenomena, that arise when intense tissue-change is occurring, as does fire when intense oxidation is occurring, and that changes in these tissues, identical in their nature, but slower in their rate from feebler cause—*that is, differing in degree, not in kind*—go on without calling into play the fire of inflammation, as oxidation, exactly the same in nature, goes on without fire in the process of rusting, &c. And it is further true that just as the products of vivid combustion of phosphorus are a different acid from the products of a slow fireless combustion, while yet the process is the same union of the oxygen and phosphorus, so a vivid inflammation accompanies different inflammatory products to those arising with a smouldering inflammation, while the producing process is the same.

The failure to recognise the identity of the causative process of vivid and of smouldering inflammation has been a main cause of our hitherto overlooking the inflammatory nature of what is roughly called atheroma in this country.

As further evidencing the little account that has been made

of the inflammatory and often disorganizing nature of the "atheromatous" change in great vessels, we may refer to the *futile discussions* that have occupied so much attention formerly, and still have a place in medical teaching—those, I mean, concerning the behaviour of the several arterial coats in the formation of aneurisms, "true, false, and mixed."

The fact is that certainly when aneurism has reached any size, and often before it has well started, the several coats of the vessel have lost by inflammation their distinctive characters. But it is remarkable that the inner layer of the vessel's coat continues through the mouth of the sac to line its interior, and often to cover over some layers of laminated fibrine, when the other coats of the aorta have evidently been quite burst through, and are not represented in the sac at all. This, no doubt, has given rise to the accounts of "hernial aneurisms," the layer of fibrine that thus continues from the artery into the sac being accepted as the old inner membrane thrust through a gap in the other coats. Yet I think there is no reason to doubt that the inner membrane and its continuity into the sac is an adventitious layer, but it is very likely that the real inner lining of arteries is formed in the same way. In the rare cases of healing of aneurism with continued permeability of the vessel the same inner layer of the arterial coat is carried over and closes the mouth of the arterial sac.

Now, in spite of the fact that commonly the several coats cannot be distinguished up to, and certainly not within, the mouth of the sac, the division of aneurisms into varieties is effected by the supposed behaviour of the several coats. The sooner that mode of distinction becomes purely a matter of history the better.

Changes of a kind that cannot be regarded as other than inflammatory are present in nearly all bad examples of atheroma; the extent of the inflammatory changes generally surpasses that of the atheromatous. And these inflammatory changes occur often without any atheroma, and especially in younger subjects, about or under middle age. The more inflammatory changes tend more to produce aneurisms than do the atheromatous patches. When atheroma is thoroughly established, so that a pulpy mass is formed in the coats at any spot, this is generally thick and hard and unyielding, and does not give way to pres-

sure so as to form an aneurism. The disease that leads to aneurism is the same disease as leads to atheroma, and I think it is a correct way of describing these relations to say that they are alternative results of this disease of the coats. I mean so that if the subinflammation is severer then the coats are softened and yield early, before the thickening and stiffening chronic process that leads to the atheroma patch has time to occur. On the other hand, if the subinflammation is lower and slower, then there is not such softening at any time in its course as to lead to aneurismal yielding; but the result is a slow thickening, which reaches a considerable and a sufficient degree before any fatty degeneration occurs within it, and then always the thickening goes further than the granular change, so that the wall of the artery is rather stronger there than weaker; and if the subinflammation be yet slower and slower the fatty or granular change in the coat goes on to an accumulation of lime salts or petrifaction of the spot, the stone in the wall showing sometimes some rude bone-cells, so that ossification may be thought really to occur, though the bone is truly a very rough production, if it be bone at all. Now, if instead of being thus slow, so as to give time for the calcareous change of its products, the subinflammation be very acute, then the arterial wall may rupture, and either sudden death or a false aneurism be the result.

It is not intended to say that no aneurism will form at a spot where the atheromatous degeneration has followed its slow inflammatory course. There, indeed, is the obvious and well-known danger of what is called a dissecting aneurism arising when the atheroma-patch has opened into the artery, and blood is insinuated in it between the layers of the coats, separating them and running between them for long distances. Except in such instances of laceration of coats, aneurism at an already atheromatous patch is, I believe, rare, and these instances of dissecting aneurisms are rather examples of diffused rupture limited to the vessel's own coat than of true circumscribed aneurism, so that they belong more to the history of ruptured artery than to that of aneurism.

But the patches which are the seats of early aneurism generally will be found to show a different state. The vessel's wall is altered in appearance and consistence. It has a bluish, subpellucid look, and when the vessel is laid open it falls into

wrinkles through being less elastic than the parts around, which by their resiliency take a certain bent to which the altered portions do not correspond. If felt, such a patch is softer than the healthy tissue, and feels flabby and deficient in resilient firmness of substance which is the artery's proper consistence.

This change of consistence, which is quite remarkable in the more acute cases, is very significant, as most parenchymatous inflammations produce such a lowering of the consistence of the substance affected. But the evidence of the inflammatory or, it will be better to say, active nature of the change is in the microscopic processes in the coats of the vessel. We cannot view active cell growths as degeneration ; whether we choose to call them inflammation or not is very much a question of words, but when we find active cell formation we no longer can possibly regard the change as of a merely degenerative kind. We may say the change is hypertrophy, but hypertrophy is inflammation when it gives rise to heat, pain, redness, &c., and in the case of the arteries how far there may be any local disturbances of this symptomatic kind is a question impossible to decide; still, the cell growth usually produces such disturbances when we are able to judge of their presence, and whether or no, these cell-changes are the only evidence of inflammation that morbid anatomy produces. They constitute the anatomical side of inflammation.

I might give practically any number of cases and drawings, showing the active cell formation in cases of atheroma, this cell formation found in the deep layer of the inner coat especially, and causing the production of little nests of cells in which fat and lime soon accumulate. But such drawings have been already published in England in Virchow's work as translated by Chance, p. 359, fig. 118. I, however, have offered at the end of this paper a careful drawing of a section through the aortic coat in a case the clinical aspect of which is given by Dr. Habershon on another page in this volume (p. 389). The inflammatory nature of the affection in this case is anatomically beyond question. The middle and outer coats and the deep layer of the inner coat are seen to be charged with lymph-cells in enormous numbers, crowded together and separating the proper elastic and the muscular fibres into little patches and

shreds, while both elastic and muscular fibres fall into a state of fatty degeneration.

I am wishful to place this case on record because I believe it is more than an anatomical curiosity. It appears to me rather to present the extreme form of the atheromatous inflammation. I should be called on to show some proof of this assertion; the proof is, I think, sufficient—thus :

1. There were in the same case numerous patches of change in the coats which graduated from the state I have depicted down to the kind of change which Wilks, Virchow, and Billroth describe as the arteritis accompanying atheroma, and even in some patches to the presence of the yellow fatty change of atheroma itself.

2. The patch itself had in the view from the interior the usual aspect of atheroma; it was only in cutting a section through the coats that we discovered the unusual nature of the change. The inner coat was thickened, and yet retained its pellucidity, and otherwise had a great deal of its normal characters, as is usual in the patches of the inflammatory stage of ordinary atheroma.

Indeed, the view of the aorta from within by no means differed from that of the ordinary run in aneurism cases. Of course a merely superficial resemblance might cover a real difference, but the intermediate degrees of change which brought, if I may so speak, the obvious inflammation down to obvious atheroma tends strongly to convince of the identity of the two changes.

If the microscopic drawing be referred to (see description of plate), the inflammatory cells will be found to be present in every coat of the vessel, the inner and middle especially. The adventitia was thickened, and adherent to the mediastinal cellulosity, so that the latter, which parted easily from the healthier portion of the vessel, became inseparable over the diseased patch, at the same time acquiring a thick, milky appearance, as from true inflammation. This, however, is not contrary to the usual result of atheroma, for it is admitted by all describers, even those who regard the atheroma as a degenerate adventitious layer, that the later stages of the change show inflammatory thickening of the adventitia. The notion that this is a later change due to irritation about the old deposit

is quite gratuitous; there is not the slightest proof of it, and, on the other hand, everything tends to show that this thickening is part of the atheroma process, and evinces, as well as the other features of it already described, the tardy inflammatory nature of the disease. This being so, the inflammation thus marked in our case is but again a more acute one than usual of the same kind.

How far is it a usual thing to find a really inflammatory condition in cases of aneurism? The answer to this question is very various, from the opinion of those who do not mention inflammation at all as a cause of aneurism, among whom are all our text-book authors except Dr. Aitken, to those who give it as a frequent cause of aneurism, among whom are especially the military surgeons. Dr. Aitken's view goes, perhaps naturally, with theirs. It would carry this paper to too great a length if I were to enumerate the instances of inflammatory aneurism already recorded, so far as I have been able to meet with them. But I should not pass over a valuable paper by Mr. Lawson ('Army Med. Rep.,' 1866), in which, after giving a series of cases of aneurisms which occurred in the command to which he was attached at the Cape, he says:

"These cases prove, pretty conclusively, that phlegmonous inflammation of a limited portion of the coats of the larger arteries and veins is by no means rare at the Cape, and, whether by the formation of abscess, as in Clegg's case, or merely by infiltration and softening of the tissues, as would seem to have taken place in some of the others, their elasticity was so reduced they could no longer withstand the pressure of their contents, and rupture took place, leading to effusion of blood, causing death, when the surrounding parts did not offer resistance to its escaping in sufficient quantity, and simulating aneurism when this impediment existed."

Although Mr. Lawson sets down the appearance to the climate of the Cape, yet I think this opinion less important than the evidence he adduces of the inflammatory nature of the aneurisms. I think it is true that the same evidence of inflammation is frequent enough in every climate. Low degrees of inflammation often surround aneurisms, causing adhesion to parts around; twice I have met with acute pericarditis from the

approach of aneurisms to the pericardium, and Mr. Lawson gives a good case of the same kind among his series.

When it is shown and believed that atheroma is originally inflammatory, and that more acute inflammations, such as the one I have represented, are of the same nature, only more intense, it will then become a question whether the inflammation is a simple inflammation—I mean a reaction to indifferent causes of irritation of the arterial coats, such as strains from over-exertion or injury—or whether specific causes of inflammation, syphilis, gout, &c., are able to produce the disease. Dr. Aitken's view is very strongly expressed. He believes that a large proportion of atheromatous inflammations are syphilitic; thus ('Princ. and Prac. Med.'):

" With regard to the influence of syphilis, I may here observe that I have dissected during the past four years (at Fort Pitt and at Netley Hospitals for invalids) twenty-six bodies of soldiers, in each of which a distinct history of syphilis was present, associated with unmistakable syphilitic lesions; and of these twenty-six cases seventeen had the coats of the thoracic aorta impaired by characteristic changes—changes which are uncommon at an early period of life, and which I have every reason to believe are due to syphilis. The changes are various from cicatricial-like loss of substance of the inner coats, small local dilatations of the artery, and in several cases aneurismal expansions, one as large as an orange, which proved fatal."

But it appears to me that the answers which some military surgeons have made to this require a more valid rejoinder before Dr. Aitken can be thought to have established this position than it is likely they will receive. The case of syphilitic disease of the aorta which Dr. Aitken has in his work alluded to—that described by Mr. Lewis ('Army Med. Rep.,' 1862, p. 512)—is certainly only a coincidence of a very ordinary change in the arterial coats with secondary syphilis, a coincidence which in the case of two such frequent diseases as these are in the army must pretty frequently occur. The argument which Mr. Cooper Todd ('Army Med. Report,' 1868) uses is of force; thus:

" But it fails to account for the supposed *increase* in the military ratio (in frequency of aneurism) of the present as compared with the past generation, for not only was syphilis quite as rife among soldiers thirty years ago as it is at this time,

but the treatment of the disease has been better understood and practised to a marked degree during this advance of time."

Mr. Myers, too ('Path. Trans.,' 1869), brings forward a very forcible argument; thus:

" Isolated cases have also been published in the ' Army Medical Reports,' where the cicatricial appearance of the inner coat of the aorta has been remarked and attributed to syphilis, and, no doubt, such cases may occasionally be met with, but that syphilis cannot be a prominent cause of aortic aneurism is, I think, very evident, as the navy, with nearly an equivalent of syphilis, has so much less of the other disease, and as prostitutes do not suffer from it, although they frequently have syphilis in its worst form."

My own belief is very much the same as that which has induced many military surgeons to strenuously advocate the relief of soldiers, as far as possible, from the excessive strain on their circulatory apparatus, which arises from the weight they carry, and especially the distribution of the pressure of that weight. The reasons which tend to induce this belief that mechanical strain is the main cause of atheroma of the arteries may, I think, be enumerated with advantage ; many of these reasons, which I think amount in all to very sufficient proof, have been urged before, but I hope to show that some facts that are often thought to oppose this belief are really in its favour.

1. The male sex shows greater liability than the female, and men are accustomed to more laborious work. It is, I think, true also that when women are the subjects of atheroma they have been used to an unusual amount of such work.

2. Whether this be true as among females or not, it is certain that the portion of the male population who evidence the greatest amount of atheroma, are those who use the greatest muscular exertion, *e.g.* sawyers, oarsmen, soldiers, persons accustomed to excessive athletic exercises, &c.

3. Those diseases that diminish the volume of blood, and the consequent pressure within the arteries, prevent almost entirely the occurrence of atheroma of the arteries ; *e.g.* phthisis, mitral obstruction, &c.

4. The pulmonary system of vessels escapes the liability to atheroma almost entirely. This has been the ground for start-
:-- a theory that venous blood has some kind of opposing in-

fluence, or arterial blood some kind of favouring influence on the development of atheroma. But a fact is often met which countervails this suggestion of an alibi, namely, that when the right heart is greatly hypertrophied from chronic bronchitis or mitral disease, the pulmonary artery then gets commonly affected with atheroma, although its blood is more venous than usual under these circumstances.

5. The earliest appearances of chronic atheroma in arteries occur at points where the strain upon the coats is greatest. The obvious example of this is in the case of the convexity of the aortic arch, which is very exceptionally liable, as is the bifurcation of the vessel. But there are other examples of this truth which have escaped notice, *e.g.* the cerebral, splenic, and cardiac arteries. The peculiar liability of these vessels to atheroma is generally admitted, and it is often supposed to prove that mechanical strain cannot be the determining cause of the atheroma. But if we consider the circulation of the brain, heart, and spleen, we shall find peculiarities suggesting very plainly that the circulation is carried on under especial mechanical tension. Thus the *brain*, by means of its *superior cerebral veins*, discharges its blood forwards into the longitudinal sinus, in a direction opposed to the current in the sinus which runs backwards; this must make the escape from the brain of the blood sent into it to be difficult, and thus lead to resistance to the flow from the arteries and tension within them; straining them, spoiling their nutrition by irritation, and so leading to " atheroma," and at last choking or bursting them when the chronic impediment has lasted years enough. The measure of this tension within the cranial circulation I have shown to be expressed in the Pacchionian bodies, which are hypertrophies of tissue from congestion around the sites of exit of the cerebral vessels : other arrangements in the mechanism of the cranial contents, such as are contrived to maintain the necessary constant fulness of the cranium, must aid in inducing resistance to the free current of blood in the brain. The *heart* is very peculiar in its parietal circulation, seeing that the ventricle's contraction throws blood into the coronary arteries, while it hardens and compresses the tissue of the heart, so as to impede at the same moment the passage of blood on through the capillaries, thus producing tension in the artery from the resisted

current. This, I think, is sufficient to lead us to anticipate that the heart's vessels would, sooner than others, suffer from any weakness, such as atheroma, which pressure elicits. Indeed, when we reflect to discover the direct causation of the impediment to the arterial blood in the athlete, we must find it to be principally due to the opposition to the arterial flow in his muscles during their over strong and over long contraction. The heart, then, is all one's life suffering as an athlete. The *spleen's* circulation shows remarkable peculiarities, for great venous spaces are constructed in it, which in a sense are obliged to wait the pleasure of the liver that they may pass on their current. We know how easily the spleen swells under hepatic obstruction. Some believe that its office is to form a sort of reservoir of venous blood, taking, during quiescence of alimentation, that flow which then is not needed in the digestive viscera. Whatever extent of this kind of view be true, it is certain that the spleen has, in playing its part, to endure a resistance to the on-flow of its venous blood, and this will surely entail a resistance and tension in the splenic artery; reduced, of course, by the tolerably ready distensibility of the spaces in question, and of the whole organ with them. This tension will strain the artery, and lead naturally, on the view I am advocating, to atheromatous disease of its vessels, to which it is very liable. The other day, Mr. R. J. Pye Smith, while acting as post-mortem clerk, pointed out to me the occurrence of two small aneurysms, on two of the divisions of the splenic artery, close to the spleen, the artery itself being very bad. Now, if we look around to find any other organs whose circulation suffers the like peculiar strain, I don't find that we discover any; so that I think it is peculiarly strong evidence of the belief I am wishing to support, that these three organs should show such great and unusual liability to arterial disease. The only other organ which shows (but under prescribed conditions) much of their excessive liability to atheroma of its arteries is the kidney. This organ, however, only shows the affection in chronic Bright's disease, with contraction and wasting of the cortex. Now, this disease goes with wasting away of the capillary glomerules in the Malpighian corpuscles of the kidney. One example, in which I made the observation very carefully, showed, in a fine section of the cortex, thirty-two wasted and closed-up

glomerules to eighteen healthy ones; now, this closure of glomerules must greatly increase the strain in the renal artery, and thus explains why, in old Bright's disease, the artery thickens and becomes atheromatous.

6. The arteries of the lower extremities are more liable than those of the upper to atheroma. Now, it may be thought that, as the lower limbs are more constantly directed downwards than the upper, the strain in them would be alleviated by the gravitation of their current, but this notion disappears when we remember that the current in the veins of the lower limbs has a longer distance to achieve, under difficulties to which those of the upper are strangers—difficulties partly from gravitation, and partly from the varying and often rather great pressure of the abdominal viscera and their contents on the cava, &c.; pressures that bring with them at last more or less varicosity of the veins, which is the correlative and evidence of strain within the artery, such as tends to widen and render similarly tortuous the arteries themselves. Under these circumstances the greater liability of the femoral arteries than the brachial to atheroma is much in favour of the belief that mechanical tension is the cause of the atheroma.

7. The appearance of the interior of the aorta in the early stages of atheroma supports the evidence that the occurrence of it is due to tension within the vessel; for the atheroma is generally not distributed without a certain suggestive pattern. It observes this rule, that the atheroma forms lines lengthwise to the vessel's course; that is, across its transverse girth. Now, the longitudinal tension in the vessel's wall is not so great as the transverse, if only for this reason that the tension wave of the pulse passes as a transient moving strain down the vessel, so that the longitudinal strain pulls on the unstrained part which the strain has left or not yet reached, and so is relieved; while the transverse strain is all round alike, and has no escapement. Now, this transverse strain will of course tend to tear the coats across its own course; that is, it will tend to tear longitudinal rents; but though it does not do this, it produces chronic longitudinal weaknesses and irritations, that evince themselves as atheromatous patches.

I might carry much farther the argument, showing that those chronic blood-impurities, the chemical diatheses, uric and oxalic

especially, go with a tendency to thick and strained vessels, and so at last with atheroma. All this probably through the resistance the impure blood meets in the capillaries, and the tension in the arteries which this resistance creates; so that dyspepsia thus becomes a source of atheroma, through the medium of mechanical strain. But this would make my paper too long. It seems to me that evidence enough has been given—1. That what is called atheroma of arteries is subinflammation of various degrees; of which the lower degrees end in fatty degeneration of the coats, along with the inflammatory products; and 2. That the determining cause of the occurrence of this change is mechanical strain. This by no means interferes with any belief that a general altered nutrition, in gout, syphilis, &c., may lay the coats of vessels more open to suffer from the said strain, and I am disposed to think that it is probably true that they do so; but no one has yet shown it to be true that they do. Indeed in the case which is especially described in this paper, and figured in the plate, the patient had had syphilis some years before. There was no other evidence of visceral syphilis in the body. As before noted, however, it was remarkable that the outer coat of the vessel was a good deal implicated, and was adherent to surrounding parts. Now, syphilis in the arteries of the brain has hitherto appeared to affect the outer coats of arteries more than any other change; it indeed within the cranium produces an *ectarteritis,* so that there is so far a slight anatomical ground for the opinion that syphilis had its part in causing the disease.

DESCRIPTION OF PLATE

To illustrate Dr. Moxon's Paper on the Nature of Atheroma in the Arteries.

FIG. 1.—Longitudinal section through a portion of the thoracic aorta, showing a diseased patch ; in examining this there are seen—

1. The outer coat swollen, and at the confines of and throughout the diseased patch becoming indistinguishable from it ; it blends with the tissue around.

2. The middle coat traced up to the patch, divided into shreds, and spread out in the thickened patch, reappearing in flecks on the section here and there ; the change in the middle coat is rather abrupt.

3. The internal coat continued over the patch, rather thickened, pellucid, and bluish in colour.

FIG. 2 shows a part of a thin slice from the section shown in Fig. 1, examined with ¼-in. objective.

a. Deep part of the inner coat, composed of fibrillar-looking substances (edges of laminæ for the most part) ; in the part near the middle coat are numerous corpuscles.

b. The line marking the commencement of the middle coat; this still is composed of elastic fibres, but beneath this at c, corpuscles in great numbers separate the fibres up into patches.

d. Shows muscular fibre, still persistent; and e, elastic fibres, likewise persistent, among crowds of the inflammatory corpuscles.

f. Fatty degeneration of the elastic fibres ; and g, of the muscle cells.

At h a relation of the corpuscles to the vasa vasorum appears to exist.

The smaller drawings at the side (more magnified) show the appearance of the elements at the points to which they are opposite, when examined with a higher power (¼-in.).

Fig 1

Fig.2

Fig 3

a

b

c c

c
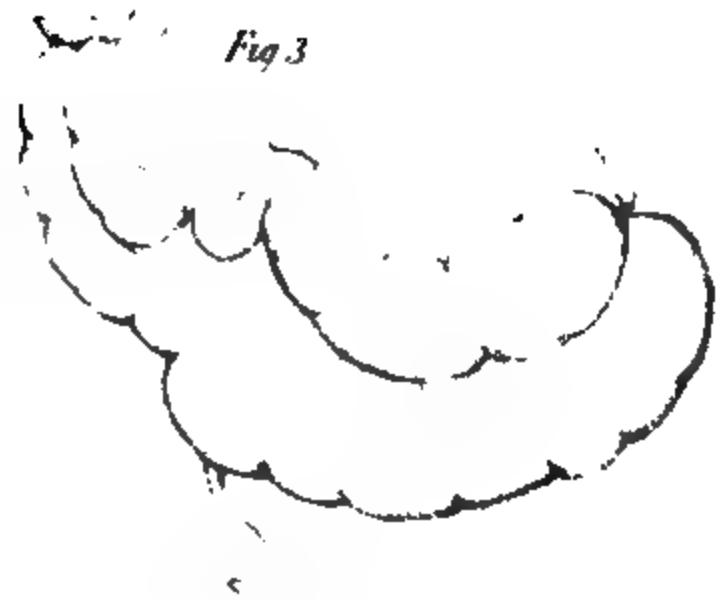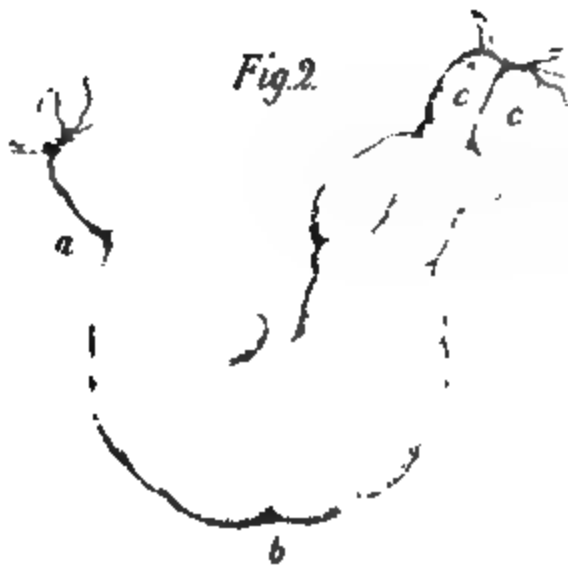
Plate II

A
SHORT ACCOUNT OF THE DELIVERY OF A TWO-HEADED MONSTER.

By J. J. PHILLIPS, M.D.

WITH A

DESCRIPTION OF ITS ANATOMY.

By B. N. DALTON.

In this communication I propose to describe very briefly the delivery of a double monster to which I was called last summer, and then to add an anatomical description of the fœtus itself, as supplied by Mr. Dalton. The specimen was presented to me by Dr. C. H. Welch, of West Hackney, in whose practice the case occurred. It has since been added to the Guy's Museum.

Mrs. R—, æt. 22, short, stout and robust, was taken in labour with her second child on the 2nd of August, 1870. At midday the head was found presenting; there were strong expulsive pains. At three o'clock the head was impacted, and an attempt was made to deliver by the long forceps, which, however, failed. The uterus appears to have remained quiescent after this till nine o'clock that evening, when the pains returned. At eleven the head was resting on the perinæum; the short forceps were applied, and the head was with difficulty brought externally, but delivery could not be advanced any further. Dr. Welch then passed his hand along the child's back, and brought down the right arm. He then discovered a second

head, and believed the child to be a dicephalous fœtus, a diagnosis which was confirmed by Dr. Dudley Kingsford and Mr. Toulmin.

An opportunity was then kindly given me of seeing the case, which I did about four o'clock. Chloroform had been administered at midnight; since then the patient had slept at intervals. The uterus was firmly contracted, almost continuously so, but there were occasional rhythmical pains. The head which was born was equal in size to that of a full-grown fœtus. The patient was again placed under the influence of chloroform. On passing my hand I found the second head closely flexed on the chest. The two necks could be traced, the one continuous with the other. After consultation it was determined, as no further progress could be expected by the natural efforts, that the external head should be removed, which I effected by means of a scalpel. After decapitation the feet were easily seized. I turned the child, and delivery was then accomplished without difficulty. The placenta and the umbilical vessels were single.

The patient progressed favourably till the sixth day, when she suffered from severe abdominal pain, which continued for some days; but she afterwards made a good recovery.

The method of delivery in cases of double monstrosity has already been well described and illustrated,[1] but instances of the kind are sufficiently rare to warrant the publication of individual cases.

Confining our attention to that variety in which the head and neck only are double, as in the present case, delivery may be completed in one of three ways. In this kind, as in other kinds of double monsters, the unaided powers of nature are sometimes equal to the emergency. This is especially the case if the feet originally present. After the birth of the trunk the posterior head may be made to occupy the pelvic cavity by drawing the body well forward over the pubes, the second head subsequently engaging in the pelvis. Nevertheless, we occasionally[2] find, when the cranium presents, that after the birth of the first head evolution takes place, the breech descends, and the second head

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[1] See especially Playfair, 'Obstetrical Transactions,' vol. viii, p. 300; and Barnes, 'Lectures on Obstetric Operations,' p. 202.

[2] See a case reported in the Catalogue of the Warner's Anatomical Collection.

is born last of all. When this does not occur, and the monstrosity has not been diagnosed before the birth of the first head, delivery may be completed either by decapitation and version, or by seizing the second head with the forceps. The latter method can hardly be recommended; it must be difficult to accomplish with safety, and has, I believe, been practised only in one or two recorded instances. The former method is far preferable, seeing how easily it may be performed, and how improbable it is that such a monster will long survive its birth.

Plate I (fig. 1) gives a true representation of the monster. It had all the appearance of a mature fœtus. Both heads were covered with thick hair, and each was as large as that of a fœtus at full time. The faces were similar, and directed forward. There was nothing specially noticeable about the external configuration of the thorax or abdomen. In the mammary regions were two small nipples in their normal situation. The umbilicus was single and central in position. The genital organs were single, and of the male sex; the testicles had descended into the scrotum. There were two anal orifices, separate about half an inch the one from the other, from which meconium issued.

The upper extremities were perfectly natural and of full size, the nails being also well developed. Two lower limbs of normal growth articulated with the pelvis in the usual way; while a third rudimentary limb projected on the left side (see dissection), in which there was no patella, and only one bone below the knee.

DISSECTION.

By B. N. DALTON.

Each of the two heads was found to be in connection with a spinal column of its own, which extended the whole length of the body of the fœtus, perfect in itself, and having no bony connection with its fellow in any part. The two columns were, in the lower part of the dorsal region, parallel and close to one another, and gradually diverged from one another both above and below.

Connected to the outer side of each column were the ribs,

which passed forwards in the usual manner to join the sternum in front. The two innominate bones of the well-developed limbs joined one another in the median line in front; this and the union of the ribs from either side in a common sternum were the only bony connections between the two halves of the fœtus.

On opening the body, it was found that a perfect diaphragm shut off the thorax from the abdominal cavity. The contents of the thorax are shown in Plate II; they consisted of a heart and four lungs with their accessories. The contents of the abdominal cavity were, two stomachs, an alimentary canal double in some parts, single in others, a liver and spleen, both well formed and somewhat larger than usual in an ordinary fœtus, two kidneys, one quite rudimentary, and two supra-renal bodies; these and the kidneys are seen in Plate II. Each of these structures requires some separate description.

Heart and vessels.—The heart occupied a position nearly in the median line, and was nearly symmetrical in shape; the vessels connected with the base were also nearly symmetrical, as there was an aorta on each side, a large superior vena cava descending in the median line, and a large vein of considerable size entering the heart on either side. The large superior vena cava was formed by the junction of the left jugular of the right head with the right jugular of the left head; this had some transverse branches joining it, and received the large trunk formed by the union of the pulmonary veins of the right pair of lungs. Each of the two lateral venous trunks entering the heart was formed by the junction of the outer jugular with the corresponding subclavian vein, and thus represented an innominate vein opening directly into the heart.

The blood returning from the lower part of the body entered the heart by two vessels. Of these one was large, and formed by the junction of the veins from the lower extremities in the following manner :—The large venous trunk from the left lower limb, after receiving the left renal and supra-renal veins, crossed the right common iliac artery, joined the corresponding vein of the opposite side, and then ascended by the side of the aorta to the posterior border of the liver, and after being connected in the usual way with the hepatic veins passed upwards to enter the heart. The smaller inferior cava was connected with the veins of

the liver, and also with some systemic veins; it had a separate opening into the heart a little to the left of the right vena cava.

The aorta of each side passed upwards and outwards, forming an arch which gave off three large trunks, and then passed down, lying on the spinal column of its own side.

Shortly after passing the diaphragm the two aortæ became fused into one vessel; this was about an inch in length, and occupied exactly the median line, lying over the interval between the two spinal columns; it gave off visceral branches and then divided into two large vessels, one to either limb and corresponding to common iliacs.

The only branches requiring further notice are those arising from the arch of the aorta; the first of these was chiefly spent in forming the carotid, but a small branch near its commence-ment corresponded to the subclavian, having the recurrent laryngeal nerve turning round it; this vessel gave off the ver-tebral artery, and ended in a few small branches to the side of the neck. The subclavian branch of the innominate is not seen on either side in the plate.

The pulmonary artery of the left side was connected with the heart, just below the origin of the left aorta, and communi-cated with this aorta by a ductus arteriosus; it was then dis-tributed to the left pair of lungs.

The pulmonary veins of this side united to form two vessels, which entered the heart near the left innominate vein.

On the right side the trunk of the pulmonary artery was represented by a very small vessel, which became impervious near the heart, to which it was connected just above the origin of the left aorta; from the heart to the ductus arteriosus the vessel was extremely small, the ductus arteriosus and the branches to the lungs were large, so that blood must have passed from the aorta through the ductus arteriosus to the lungs.

The pulmonary veins of this side also had no direct com-munication with the heart; from the point of junction of the branches from the lungs a small vessel proceeded, to be con-nected with the heart just below the entrance of the right in-nominate vein, but the main channel from the lungs was through a large vein which passed upwards to join the superior

vena cava. The small vein became impervious before reaching the heart.

The interior of the heart was divided into three cavities. There was but one auricle, into which entered the superior vena cava, the right and left innominates, the two inferior venæ cavæ, and the pulmonary veins of the left pair of lungs. The only representative of a septum was a small muscular band, which extended from the anterior to the posterior wall of the auricle between the two auriculo-ventricular openings. The right ventricle formed the greater part of the front of the heart and gave off the two aortæ. The left ventricle gave origin to the pulmonary artery of the left pair of lungs; it was much smaller than the right ventricle, and its walls were thinner. The right auriculo-ventricular opening was much larger than the left. The septum ventriculorum was defective above, an opening about a quarter of an inch in diameter existing just below the origin of the left aorta.

Lungs.—These, as before stated, were four in number ; the two situated nearest the median line were small and situated behind the heart, their apices are seen projecting above the heart in the plate.

Alimentary canal.—An œsophagus passed from each head downwards on the spinal column of its own side. After passing through the diaphragm each œsophagus terminated in a separate stomach ; the pyloric end of each stomach was directed towards the median line, and from it proceeded a canal about half an inch in length ; these two portions joining one another became fused into a single tube, which extended in the usual coiled manner about six feet ; it then suddenly dilated, and from the dilated part two intestinal tubes proceeded : these were perfectly distinct from one another, and connected together only by peritoneum ; thus united they continued onwards some feet further, and then diverging from one another each ended in a separate cæcum.

Figs. 2 and 3 in Plate I show these points; a small diverticulum is seen connected with the dilated portion of the small intestine.

The large intestine was double throughout its whole extent, the two canals being placed side by side in all their course, except just at the commencement, and near the termination,

where the canals again diverged to terminate each in a distinct anus.

The liver.—This was large and placed on the right side. The gall-bladder was single.

The spleen.—This organ was connected with the left stomach, it was rather larger than in an ordinary fœtus.

The kidneys and supra-renal bodies.—There was a kidney of the usual size on the right side; on the left this organ was extremely small, measuring about half an inch in the longest diameter. The ducts of these two glands passed down to the bladder, which was single and placed in the median line. There was a well-developed supra-renal capsule on each side.

Nervous system.—No examination could be made of the brain in either head.[1]

There were four pneumogastric nerves, and no doubt all the other cranial nerves were developed on each side as the parts to which these are distributed were all developed.

There were two spinal cords, the nerves from the outer side of each were large and distributed to the corresponding upper and lower extremity; the nerves from the inner side, having but little to supply, were extremely small, except at the lower part of the right cord, where nerves came off for the supply of the rudimentary lower limb. Thus the rudimentary limb was shown to belong to the right half of the fœtus.

[1] It would have been particularly interesting to examine the brains, and observe any difference in the development of the brain corresponding to the absence of half the body.

DESCRIPTION OF PLATES,

Illustrating Dr. Phillips' paper on the Delivery, and Mr. Dalton's description of the Anatomy, of a Two-headed Monster.

PLATE I.

Fig. 1 represents the exterior of the foetus.

„ 2 shows the portion of alimentary canal where the single tube (*a*) forms a dilatation (*b*), from which proceed the two tubes (*c, c*).

„ 3 shows the terminations of the two small intestines in the two large intestines.

PLATE II.

a, b.—Right pair of lungs.

c, d.—Left pair of lungs.

e.—Auricular portion of heart.

f.—Central superior vena cava.

g, h.—Right and left innominate veins.

k, l, m.—Bronchus, artery and vein of the lung (*a*).

n.—Trunk formed by the junction of the pulmonary veins of right side, entering the superior vena cava.

o.—Left pulmonary artery joining the left aorta and giving off the branch (*p*) to the lung (*d*).

q.—Inferior vena cava.

r.—Hepatic vein.

s, s.—Supra-renal bodies.

t, t.—Kidneys.

v, v.—Ureters passing down to the bladder (*w*).

x.—The double large intestine.

The arteries are so plain that no references are required to understand them.

Fig.

A DESCRIPTION

OF THE APPEARANCES OF THE

HUMAN EYE IN HEALTH AND DISEASE

AS SEEN BY THE OPHTHALMOSCOPE.

FIFTH SERIES.—SYPHILIS.

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By C. BADER.

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GENERAL REMARKS.

Figs. 1, 2, and 5 of the plates refer to inherited syphilis. Such appearances are frequently observed in persons who have suffered from syphilitic (so-called interstitial or strumous) corneitis (the form of corneitis so well described by Mr. Jonathan Hutchinson in the 'Ophthalmic Hospital Reports' for 1857 to 1859).

Figs. 3, 4, 6, 7, 8 represent changes observed in the eyes of persons suffering from " secondary syphilis."

The proofs of the intraocular changes represented in the plates being owing to syphilis are altogether of an empirical kind. The patients, in whom they were observed, suffered from syphilis. In inherited as well as in secondary syphilis the final effects of the morbid changes are those of atrophy, *i. e.* destruction of more or less of the textures affected.

The general features of intraocular syphilitic changes are those of temporary hyperæmia round a focus of " effusion," " lymph formation," temporary loss of transparency, frequently with rupture of blood-vessels, and finally atrophic changes—a repetition of what so often is observed in the cornea and iris. Opacities in the vitreous chamber are frequent, and may be so considerable as to hide the retina, &c., from view.

Outward inflammation—redness of the conjunctiva or sclerotic, iritis, corneitis, &c.—accompanying deep-seated inflammation is not the rule. Often we find traces of iritis in one eye, with inflammation of some part of the choroid in the other.

Pain, as long as the inflammation is confined to the parts which lie within the area of the retina, is hardly ever complained of. Loss of transparency and of definedness of outline, is found at the inflamed part.

Lymph nodules (figs. 3, 4) and general turbidity (figs. 6, 7, 8), owing to effusion into and round the choroid and into the adjoining retina and vitreous chamber, are the usual forms of effusion.

Anæmia (arterial) of the retina is observed in most cases during the stage of effusion and of atrophy (figs. 3, 6, 7, 8).

Peculiarities in the colour, size, and outline of the optic disc (optic nerve) are observed in all cases in which the inflammation appears in the tunics immediately adjoining the disc. The outline of the optic disc is more or less effaced (figs. 3, 6, 7, 8); when the inflammation has ceased, we find atrophy (a yellowish and white ring round the disc) marking the seat of passed inflammation.

Figs. 3, 6, 7, 8 represent forms of inflammation frequently observed—inflammation of the optic disc and of the choroido-retinal aperture and of the vitreous adjoining it.

The form represented in figs. 7, 8 is accompanied by increased tension of the eyeball (T+½), the one shown in figs. 3, 4, 6, often by decreased tension of the eyeball (T−½). The swollen or inflamed condition of the optic disc naturally interferes with the passage of the blood intended for the retina. Sometimes no blood at all is visible in the arterial blood-vessels (fig. 7), or only a few thin blood-vessels can be traced across the ill-defined disc into the retina (figs. 6, 8).

Whether the anæmic and partial atrophy (judging from the much impaired sight of the eye) of the optic disc of fig. 2 is owing to inflammation of the disc or of the adjoining choroid, or of both, it is difficult to decide.

White patches, as seen in figs. 1, 2, are found in many highly myopic eyes, as the result of mere distension of the tunics; they may in this case be the sequel of choroiditis. That the optic disc of fig. 2 had been inflamed becomes probable from the state

of the retinal blood-vessels which have to pass through the disc. The arteries, as regards number and calibre, are much below par, while the veins are highly varicose.

Atrophy of the part invaded by the effusion, is the usual sequel. Ophthalmoscopic appearances vary, according to the stage of atrophy; they are very conspicuous in the choroid. Absence of blood and pigment renders the choroid transparent, and brings into view the white sclerotic; such spots are termed white atrophic portions of choroid. It must be borne in mind that the white colour is derived from the sclerotic, seen through the transparent choroid. White spots in the choroid itself, lymph-nodules, some kinds of infiltrations, tumours, &c., often occur. Their ill-defined outlines, their want of brilliancy, the absence of pigment, the turbid condition of adjoining parts, readily distinguish them from transparent atrophic parts of the choroid.

Pigment patches, in groups, circles, well defined, of deep brown or black colour, skirting or overspreading transparent atrophic parts, or occurring alone, are often seen (see figs. 1 to 5). Displacement of choroidal and hexagonal pigment-cells, with saturation of the tint of their pigment-granules, is the most frequent cause.

Atrophic spots in the retina are generally transparent. Impaired or destroyed function of portions of retina, especially if these rest on atrophic portions of choroid, with anæmia of the retina, points out such atrophic patches. Such patches were situated upon the atrophic choroid patches shown in figs. 1, 2, 4, and 5, as shown by the impairment or loss of sight of these parts.

The sight.—In the majority of cases we observe the loss or impairment of sight to be not sudden (as in apoplexy), but rapid, within from twelve to thirty-six hours (as in the case of figs. 3 to 8). Those who have observed the quick appearance and increase of lymph in iritis will readily understand the cause of the rapid impairment of sight. In most cases of syphilis the impairment of sight could be traced to "inflammatory" effusion among the structures of the visual apparatus. The impairment of sight, if the effusion localises itself in the region of the yellow spot, is generally perceived at once. If occurring in certain parts of the cerebral visual apparatus, or round the

optic disc, or along the margin of the retina near the ora serrata, it may escape notice at first.

Treatment.—Wherever within the eye the morbid changes be situated, whether the iris or cornea be implicated or not, have the pupil kept well dilated by atropia, and continue this for three or four weeks from the time when the attack commenced.

One or two leeches to the temple at bedtime will relieve pain, should the effective use of atropia, as shown by the dilatation of the pupil, not have done so.

The inconvenience arising from intolerance of light should be obviated by the use of blue-tinted spectacles.

No near work, reading, &c., should be allowed while inflammatory changes are existing. Once the atrophic spots have appeared, the free use of the eyes may be permitted.

General medical treatment should be tried in all cases. Mercury during the formation of lymph and of effusion, and iodide of potassium after this stage has passed, are freely given at Guy's.

The patient should live well, but while under medical treatment should abstain from malt liquor.

If within from four to six weeks no marked improvement of sight ensues, little hope remains. Iridectomy can be recommended if the tension of the eyeball is increased, especially if the optic disc represents the appearance shown in figs. 7, 8.

The prognosis of cases like figs. 6, 7, 8, is unfavorable, and the course very chronic.

DESCRIPTION OF THE PLATES

Illustrating Mr. Bader's Description of the Human Eye in Health and Disease as seen by the Ophthalmoscope.

Fig. 1. Right eye. Fig. 2. Left eye. From a patient, æt. 17, suffering severely from inherited syphilis. Both eyes eighteen months ago were impaired by corneo-iritis; both at present are what is termed hydrophthalmic; there exists bare perception of shadows of the left, high degree of weak and of short sight of the right eye. The left eye had been defective as long as the patient remembers.

Fig. 1. The yellowish-pink round optic disc (optic *nerve*) (represented much enlarged) occupies the middle of the figure; diverging from its clear centre we observe numerous retinal arteries and veins (the darker vessels represent the veins). Surrounding the optic disc we see a white figure (the sclerotic, seen through the atrophic choroid and transparent retina). A brownish-black line of pigment intervenes between this white figure and the red colour of the choroid. The latter, near the white figure, has a much lighter red tint, indicating a thin—somewhat atrophic—condition of the choroid. In the red choroid we observe a peculiar network of darker red lines (closer set patches of capillary blood-vessels of the choroid).

Fig. 2. Left eye. The optic disc, in the middle of the figure, differs, as regards colour, from the one of the right eye (fig. 1); it appears grey (anæmic) with a clear centre. The retinal vessels, which diverge from it (especially the arteries), are less numerous than in the right eye, while the retinal veins are very varicose, probably owing to morbid changes in the optic disc, giving rise to impeded in- and egress of blood.

As regards the white figure round the optic disc, the pigment, the varieties of red colour of the choroid, the same holds good as for fig. 1.

Figs. 3 and 4. From the left eye of a person, æt. 33, suffering from secondary syphilis. The pupil of this eye was sluggish, somewhat dilated; there were no outward signs of inflammation; with this eye large objects could be recognised with difficulty. The right eye had suffered from repeated attacks of iritis.

Fig. 3. The optic disc (optic nerve) and the tunics immediately adjoining it. The somewhat oval-shaped optic disc occupies the middle of the figure; its grey colour is of a lighter tint in the centre (where there are no nerve-fibres, but only connective tissue). The disc is surrounded by a yellowish ring, which shades off into the red colour of the choroid. Diverging from the optic disc, we observe the retinal blood-vessels; some of these are unequally dilated; others, owing to impaired transparency of the retina, are barely visible in some places.

The two yellowish, round, somewhat ill-defined spots, to the left of the optic disc, are supposed to be nodules of lymph, situated in the choroid; a retinal blood-vessel may be seen passing over them. The group of black and yellow spots above and to the right of the optic disc represents atrophic portions of choroid.

Fig. 4. A portion of the sclerotic, choroid, and retina of the eye represented in fig. 3.

The yellowish, somewhat ill-defined, small round spots, seven in number, are supposed to be nodules of lymph, situated in the choroid. The yellowish spot in

the centre, and the one at the lower margin of the figure with brownish-black spots upon it, represent atrophic portions of choroid. Previous to this, lymph and infiltration are supposed to have occupied these parts of the choroid. Ramifying over these spots and over the uniform turbid red colour of the choroid, we notice blood-vessels of the retina; some, especially those over atrophic portions of choroid, are abnormally large. In the choroid to the right of the figure we see a large blood-vessel, and along its sides a yellowish line, which may be lymph.

Fig. 5. Left eye. From a person, æt. 11, suffering severely from inherited syphilis. Both eyes were large—"hydrophthalmic"—and had suffered from corneo-iritis. There was partial loss of sight.

The figure represents the optic disc (optic nerve) and the tunics immediately adjoining it. The light grey blue (anæmic), somewhat oval-shaped optic disc occupies the centre of the figure; diverging from it we see the blood-vessels of the retina; their number and calibre, considering the age of the patient, are much below par. The narrow yellowish-white ring round the optic disc—somewhat ill-defined where it joins the red colour of the choroid—is observed in most eyes in which choroidal changes, with inflammation, have occurred. The yellowish-white and the black spots represent atrophic portions of choroid.

Fig. 6. Right eye. From a patient, æt. 34, who suffered from secondary syphilis; pupil sluggish, of medium dilatation; no outward sign of inflammation; bare perception of shadows.

The ill-defined grey-white part in the middle of the figure represents the optic disc (optic nerve) and the tunics immediately adjoining it. Diverging from the middle of the grey-white part we observe few thin retinal blood-vessels. Their outlines are very indistinct where they pass from the grey (infiltrated opaque retina) upon the red (transparent retina, subtended by red choroid) portion of the figure. Infiltration, swelling, and loss of transparency are the cause of the altered colour and of the loss of definedness of the optic disc and adjoining tunics.

Fig. 7. Right eye. From a patient, æt. 49, suffering from secondary syphilis; had iritis in both eyes; bare perception of shadows.

The dirty red, ill-defined sketch, occupying the middle of the figure, represents the optic disc (optic nerve) with a narrow strip of the tunics adjoining it. No defined retinal blood-vessels, no details of the surface, boundary, &c., of the optic disc are visible; this is owing to infiltration and to concomitant morbid changes of the choroid, retina, and of the adjoining vitreous substance.

Fig. 8. Right eye. From a patient, æt. 47, suffering from secondary syphilis; pupil sluggish, medium dilatation, no outward inflammation; perception of large objects. Had iritis in the left eye.

The optic disc (optic nerve) (represented much enlarged) occupies the middle of the figure. The greyish-red ring defines its outline; the optic disc, compared with the red colour of the choroid, has a lighter turbid red colour. Diverging from it we observe a few retinal blood-vessels; their outlines, owing to impaired transparency of the adjoining structures, are indistinct. The choroid (the red surface which surrounds the optic disc), instead of having a clear transparent red colour, appears turbid red; this is owing to impaired transparency—from chronic inflammation—of the choroid, of the retina, and of the adjoining vitreous substance.

MISCELLANEOUS SURGICAL CASES.

CANCER OF THE FEMUR; FIBRO-CELLULAR GROWTH IN THE THIGH; ENCHONDROMATOUS TUMOUR OF THE THIGH; EXOSTOSIS OF THE FEMUR; THYROIDAL TUMOUR OF THE NECK; HYDROCELE SIMULATING HÆMATOCELE; CYSTIC MYXOMA OF THE TESTICLE.

By ALFRED POLAND.

CASE 1.—*Cancer (medullary sarcoma) of the femur; implication of the tissues of the thigh, and subsequently of the ilium; pregnancy, and birth of a healthy nine months' child; death; autopsy; cancer of the lung.* (From notes by Mr. George Eastes.)

Margaret M—, æt. 34, admitted into Guy's Hospital, on November 21st, 1866, under the care of Mr. Poland. A spare woman, of fair hair and complexion; married, and has four children alive and healthy. She has always enjoyed the best of health. About fourteen months ago she had a lingering labour with her last child, and thinks she sprained her right leg in some way or other at the time. She was up and about three weeks afterwards, but at once felt pain in the right hip and knee when standing; she, however, remained at her household duties until five months ago, when she was suddenly seized with agonising pains in the right hip and groin, and then first discovered a swelling at the junction of the anterior and outer surfaces of the thigh, about eight inches below the anterior superior spine of the ilium. She applied poultices and fomentations without benefit, and then became an out-patient at Guy's Hospital, continuing to attend for a period of four months, taking quinine

and other tonics. During this time the swelling increased, more especially after standing upon the leg all day, but it diminished somewhat after resting the limb. The pain at night had latterly been so severe and gnawing as to prevent sleep, more particularly so if she remained all day at her work.

On admission she stated that she had become much thinner than formerly, but the marasmus is not far advanced. The sleep is broken from the pains at night; the appetite poor; she menstruates regularly.

There is now a large tumour in front of the right thigh, extending from the trochanter major downwards, to the extent of four inches; it passes over the fore part of the limb towards the region of the adductor muscles on the inner side; it also extends upwards to the line of Poupart's ligament; it surrounds the upper part of the thigh altogether, except between the trochanter major and tuber ischii. It is tolerably well defined at its lower margin, and is very tender on pressure near the great trochanter, but not so at any other spot. The skin over it is not adherent, but the tumour itself seems firmly united to the deeper structures, and gives the idea of being spread out underneath the superficial tissues. The tumour generally is hard, semi-elastic, but gives somewhat a sensation of fluctuation at the upper and inner part; its surface is a little irregular. The femoral artery can be felt along the front part of the growth, being pushed to its inner side; although apparently superficial, it seems imbedded in the substance. The circumference of the tumour, at its thickest part near the trochanter, is twenty inches; that of the left thigh at the corresponding level is seventeen inches. There is no œdema of the leg, but she says the tissues behind the knee-joint become swollen if she stands up for a long time, and even then there is no general swelling of the leg. There was no pulsation in the tumour, and the anterior and posterior tibial arteries pulsate normally.

The tumour was explored by means of a small trocar and canula, at the most fluctuating spot, about one and a half inch to the outer side of the femoral artery, and about three drachms of blood-coloured fluid were drawn off. This fluid did not coagulate spontaneously, were viscid in consistence, and under the microscope was found to be crowded with disintegrated blood-

corpuscles of all shapes and sizes, but no distinct evidence of cancer-cells was found, although looked for repeatedly. However, the tumour was considered to be one of a malignant nature, and its removal quite out of all question. The only feasible operation was amputation at the hip-joint, but the patient persistently refused to undergo any operation whatsoever. The puncturing of the tumour gave great relief to the tension of the parts, and she was somewhat easier. On careful examination the glands over Poupart's ligament were found enlarged, as also some glands at the site of the saphenous opening; they were swollen and indurated.

She remained in the hospital for three weeks, and fancied that the tumour was increasing in size upwards at the upper part of the thigh. She wished to be at home with her family.

On October 2nd, 1867, she was again admitted into the hospital under Mr. Cock, in Dorcas Ward. The tumour was very much larger than it was when she left the hospital last December. It had gradually been increasing in size ever since. The circumference of the thigh now is twenty-eight inches. She has not been able to stand on that leg for more than a few minutes for the last four months—has generally lain upon a sofa. She became pregnant soon after leaving the hospital, and as the time advanced she says the thigh visibly increased in size every week. Her fifth child was born on September 25th last. She had a lingering labour, and great pain in the parts around the tumour. She had not done anything to it since she left. The child was healthy, and quite a nine months' one, and is living.

On admission.—The tumour and thigh presented the same characters they did last year. The circumference of it is much increased, and the patient is much thinner than she was ; she looks anxious and careworn; says she has always had plenty of food.

The tumour has grown, especially forwards and inwards from trochanter major to pubes and inner side of thigh, and the shaft of the femur, just beneath the trochanter, can be felt on the outer side of the thigh, and when turned forwards its surface appears to be continuous with that of the tumour, there being no line of demarcation to be felt between them. The whole of

the limb below the tumour is highly œdematous. Cutaneous capillaries are visible on the surface of the thigh.

5th.—The tumour was injected with morphia to-day.

10th.—Pain not so bad since injection was used, but she refuses to have it again used; says it makes her feel so unwell afterwards. Left the hospital on October 18th, 1867, preferring being at home.

This case was lost sight of until the October of the following year, when she came under the care of Mr. Henderson, of Deptford, who persuaded her again to enter the hospital, so that she might have more nourishment, wine, and the requisite attention in her present condition.

She was admitted for the third time into the hospital, on November 3rd, 1868, under the care of Mr. Poland. She has now a miserable and careworn look, and has become extremely emaciated. Both lower extremities are swollen, œdematous, and dropsical, the right thigh, leg, and foot being considerably enlarged. The swelling of the thigh has been rapidly increasing in size since last year, and now measures thirty-four and a quarter inches in circumference; it is firm, hard, and inelastic, occupying chiefly the upper part of thigh, is even on the surface, and rather globular in shape; anteriorly there are two bluish spots the size of a nut, somewhat raised, and containing fluid, the skin being here thin and on the point of giving way; some enlarged veins meander over the tumour. About a few lines above Poupart's ligament there is a distinct swelling of the size and shape of a hen's egg, and rather softer than the swelling of the thigh.

She seemed much exhausted, and appeared to be in a dying state; she, however, lingered on for three weeks and a half, and during this period the bluish spots gave way, through which protruded masses of fungus hæmatodes, attended with copious sero-sanious discharge of a very offensive smell. Her sufferings were relieved by morphia, and she complained of difficulty of breathing, and was obliged to be raised up in bed to allow of more easy respiration; she was too ill to be examined. She became gradually exhausted, and died on November 29th.

The following are the details of the post-mortem examination as kindly furnished by Dr. Moxon :

The body was inspected thirty-five hours after death; there

were scarcely any signs of decomposition present; the weather was cold and dry.

She had fair hair, and was very spare; there was much dropsy of the lower limbs.

The right thigh had an enormous enlargement in its upper three fourths, which swelled out, especially forwards; there were three or four fungous growths of a cancerous character (fungus hæmatodes) protruding at several points, chiefly at the upper and inner part, middle and outer, and anterior and lower parts.

The femur was dissevered by the cancerous mass.

On removing the integuments and fat the fascia lata was found to keep in bounds the growth, except at those points where the growth was coming through the skin; one of the latter spots, however, had the fascia preserved over it, the skin having not yet been reached, the process being earlier. The muscles of the thigh were greatly changed, and yet partly displaced before the growing cancer.

The tumour was, on section, composed of an indescribably confused material, very soft indeed and cerebriform, being, in fact, very like the grey brain matter, but it was much firmer where bound down by the gluteal fascia and fascia lata. It was only in small parts, generally about the circumference and at the upper and outer part, where it showed any of the original growth. The main bulk of the tumour consisted of blood in various stages of transformation; there was about one fourth of it apparently recent, the other three fourths being either yellowish or brownish, or purplish, and had the appearance of clot which has been long in aneurismal sacs, being laminated and toughish in parts, but on the whole very rotten.

The femur was quite divided; its lower fragment constituted the lower half of the bone, or rather more, and it ended above in a spiculated extremity. The upper end of the femur was represented by the cartilage of the head of the bone, which was like a thin capsule of soft cancer, and which broke up when accidentally taken hold of by the fingers, bursting open in several directions into angular fragments. The ligamentum teres was cancerous at the root, but not far, and its remaining portion, together with the capsule of the joint, resisted the encroachment of the disease.

The ilium was invaded both at the acetabulum and at the

anterior inferior spine, as well as the regions thereabouts, evidently by contiguity. There was a little patch of soft bone about the region of the trochanter major.

The femoral artery ran through the cancer tissue, and was not involved, but the femoral vein had distinct polypoid growths of cancer within it; these had the same microscopic appearances as the principal growth, viz. small cells, round and spindle shaped, generally having one end drawn out and not the other.

The inguinal glands were, where they could be identified, free from cancer.

The right iliac region was raised up by the tumour growing under the peritoneum in the iliac fossa; this came from under Poupart's ligament, and spread into the tissues of the fossa indiscriminately.

The lumbar glands free from cancer.

The spine and prevertebral glands were also free from cancer.

Brain natural, and the venous blood in the brain moderate.

No cancer of the ribs.

Several cancerous masses of the lung projected like polypi from the surface of the pleura; these secondary cancers came from the surface of the lungs, but were rooted in the tissue. There were several of small size, in the form of rounded masses, beneath the pleura. Those that projected were large and white on section, and very soft indeed, so that they scarcely would hold their consistency.

Heart very small, and especially the left ventricle; the muscular fibres firm, and scarcely any fat.

There were some round white patches on the right ventricle, which contained tough fibrine.

Pulmonary artery stained from post-mortem decomposition of blood.

Liver weighed 40 oz.; was pale, firm, not lardaceous. No cancer.

The capsule was adherent at one spot over the junction of the two lobes, and here there was a depressed scar-like patch, and in its depth was a fibroid tumour, which was a yellow opaque patch of cheese-like matter of very small size; the whole patch was like a miniature syphiloma, but one could not find any other signs of syphilis.

Spleen firm and healthy, weighed 6 oz.

Kidneys defaced by post-mortem discoloration; no cancer; weighed 8 oz.

Ovaries shrivelled, unadherent.

Round ligament of the affected side thicker than natural, perhaps cancerous.

Remarks.—The disease, when first coming under the notice of the surgeon at the hospital, was much advanced, being to all accounts of fourteen months' duration; it involved the soft tissues about the thigh-bone, so that it was impossible to determine the original seat of the growth; and it so completely covered the inner, front, and outer parts of the femur, as to preclude one from ascertaining whether the bone was involved in the disease. The nature of the tumour was considered to be of a malignant character, of the encephaloid variety; there were one or two fluctuating points, the largest of which was explored, in order to assist in the diagnosis, but the fluid collected gave only evidences of broken-down blood-globules, such as are often met with in blood-cysts in those forms of cancer, but no cancer-cells were discovered. So far there was much obscurity in the case, and opinions were expressed as to the possibility of the tumour being of a benignant character, and not malignant. Under these circumstances it was suggested that the mass might be removed under careful dissection. However, after mature consideration and consultation operative measures were not deemed justifiable, and this conclusion was arrived at mainly from the great want of definition of the tumour at the upper and inner part of thigh, extending, as it was presumed, deeply among the adductor muscles; and, moreover, the femoral vessels were pushed to the inner side, running along the surface, and appearing deeply implanted in and adherent to its walls. The only feasible operation was amputation at the hip-joint; but this also was considered one of risk, inasmuch as the glands in the groin seemed involved. However, the patient would not consent to any operation, even should it have been considered necessary. It is fortunate that one did not attempt its removal, as the growth after death was found to be one which involved the thigh-bone, and its origin had commenced in the medullary structure of the interior of the bone itself. The patient lived two years after this occurrence, and one very remarkable point in her case was that she became pregnant during the growth

of the tumour, went through the regular period of utero-gestation, and was delivered of a fine healthy child after a very lingering labour; during the whole of this period the tumour did not cease to grow, a fact worthy of note. The tumour underwent the usual process of such diseases, viz. inflammatory softening, breaking down of its structure and formation of blood-cysts, giving the tumour the appearance of what used to be described as fungus hæmatodes.

The post-mortem evidences gave satisfactory proof of the disease being primary cancer of the thigh-bone, and commencing in the upper third of that bone; there was not any secondary cancer in any of the lumbar glands or other organs, with the exception of the lungs, and it is curious that no evidence of lung mischief was observed during life, except at the close, when the patient had to be propped up in bed to relieve the impeded respiration.

One other point may be drawn attention to, viz. the encroaching of the cancer growth into the femoral vein, as small polypoid excrescences. There was also very little new bone in the softened cancer mass. The former structure in its upper third was entirely disintegrated, leaving only the prominent and spiculated projection of the lower portions.

It has not been considered necessary to give a diagram of the microscopical appearance of the growth.

CASE 2.—*Fibro-cellular tumour of large size, occupying the outer and back part of the left thigh and growing from the line aspera of the femur ; removal ; recovery.* (From notes by Mr. Younger.)

Ann C—, æt. 42, admitted into Guy's Hospital under the care of Mr. Poland. She has been married twenty-two years; has had eight children, six of whom are living, and has had one miscarriage. Is thin and slightly cachectic; had typhus fever fourteen years ago; no evidence of syphilis. About twelve months ago the patient noticed a slight swelling on the back of the left thigh, accompanied with uneasiness, but no pain; she could give no cause for its appearance, and did not take much notice of it, thinking it might be a sprain, although she had no knowledge of any injury. Since that period the tumour has

gradually and slowly increased in size, and latterly became more painful, with a sense of tension, but the pain has at times completely left her. She has perceptibly lost flesh and strength, and the appetite has become much impaired; she has, however, kept about at her ordinary duties until within the last month.

On admission there was a large tumour on the outer and back part of the left thigh, about eight inches long, and of an ovoid elongated figure; it extended from the base of the trochanter major to within a few inches of the knee-joint towards the insertion of the outer hamstring muscle. It was hard, elastic and resisting; seemed to be uniform on the surface, and having some small tortuous veins meandering over it; it was painful on pressure and could be rolled from side to side, as if seated on a deeply fixed basis, more especially so when the knee was flexed and the muscles at the back part of the thigh relaxed; still, it was so far firm as to raise doubts about its osseous origin. The circumference of the thigh at the most prominent part of the tumour, about six inches above the knee, was fifteen and a quarter inches, the circumference of the thigh at the corresponding spot on the other side being twelve and a half inches. The patient could not straighten the limb. There were two enlarged glands in the groin, but these were only slightly perceptible, and considered to arise from irritation.

Much doubt existed as to the nature of the tumour, whether it was a simple fibrous growth, or one of a more formidable nature, in consequence of the large size it had attained within the space of a twelvemonth. It was decided that the tumour should be explored by incision and removed if feasible, and if otherwise that amputation should be performed.

Under chloroform an incision, four inches long, was made into the tumour, and then its purely fibrous glistening character was at once exposed and its benign character ascertained; it also proved to be encapsuled, but was tightly bound down by the strong fascia of the thigh, lying under cover of the biceps and semi-membranosus muscles at the upper part, and penetrating into the outer part of the popliteal space below; the incision was therefore rapidly extended both upwards and downwards to the extreme extent of the tumour, and was in all about ten inches long. The fascia having been divided freely, and the capsule of the tumour fully laid open, the tumour was readily

detached and enucleated on either side by means of the hand, leaving only its deeper connections to be released; these proved to be very firm indeed, and extended the whole length of the tumour in a kind of longitudinal dense pedicle attached to the linea aspera; these adhesions had to be forcibly divided with the knife before the tumour could be released, and it was found necessary also to cut through some fibres of the adductor magnus muscle near its insertion, in consequence of the firm adhesion of the tumour to it. A small prolongation of the growth ran along the tendon of the biceps muscle, which had to be cautiously removed along with the tumour from off that tendon and its accompanying nerve.

Some bleeding occurred from the vessels of the adductor magnus muscle, which was commanded and restrained by torsion; the wound was temporarily filled up by sponges for a couple of hours, when these were removed, and the edges of the wound brought together by sutures and strapping.

No secondary haemorrhage occurred; some slight febrile re-action ensued; she was very weak and depressed, probably from the shock of the operation, but she rallied and progressed favorably, though very slowly. The greater part of the wound healed by first intention, but the margins of the wound subsequently gaped open to the extent of an inch; there was no inflammation, but great signs of want of power; feeble flabby granulations sprang up; much suppuration followed. She had an attack of diarrhoea and retching, a hacking cough with pain in the chest. These untoward symptoms soon subsided, the suppuration gradually ceased, the wound became almost entirely healed, and she left the hospital for the country three months after the operation.

Remarks.—This case, like the former one, was not seen until the disease had made great progress, and, like it, presented to the superficial view a most formidable aspect, and gave one the idea of its being of a malignant nature, in consequence of the size it had attained within the space of a twelvemonth. The woman looked cachectic, she was thin, and getting rapidly more so; she had the aspect of one suffering from internal cancer or a wasting disease, and everything tended to an unfavorable prognosis. But, on the other hand, the tumour was firm, almost hard, elastic, and on its surface it was not in itself painful, ex-

cept when great pressure was exercised upon it; and above all, it was ovoid, and had a very perfect definition when the muscles in its neighbourhood were relaxed, and did not seem to involve these muscles, the surrounding tissues, and the integument; again, with tolerable accuracy it could be rolled from side to side as if upon a keel-like basis, and the femur, as far as manipulation could effect, seemed to be perfectly healthy, without any thickening or enlargement. The only drawback was the slight enlargement of the inguinal glands, but this was considered to be simply the effect of local irritation. The eventual issue of the case may be hopeful in the extreme, for the tumour turned out to be one of those fibro-cellular growths which often spring up from the fibrous tissues and the periosteum of bones; a kind of outgrowth, and consisting of pretty densely packed fibre tissue. On section it had a uniform pale white appearance, and on microscopical examination consisted of fibrous elements, without any trace of cells of a cancerous nature, although there were observed several oval nuclei between the fibres.

CASE 3. — *Enchondromatous tumour near the base of the trochanter major, in front of the hip-joint ; removal ; joint partially opened ; recovery.* (From notes by Mr. Kynaston.)

Wm. H—, æt. 35, a plate-glass maker, admitted into Guy's Hospital, under the care of Mr. Poland, on February 14th. He had always enjoyed good health until he was twenty-six years of age, when he says he suffered a great deal from biliousness, and for the last four years has not been able to work, in consequence of pains in the stomach, for which he became an in-patient at St. Bartholomew's Hospital some two years ago. He has been accustomed to drink pretty freely, but not to excess. About eight months ago he was operated on for hæmorrhoids in the London Hospital, and soon after this he began to complain of weakness in the leg. Four months back he first noticed a lump on his thigh, which was very small, but has since grown very fast, especially within the last six weeks, and has caused him to limp; latterly he has had a peculiar crackling sensation in it during the movements of the hip-joint. He complained besides of a recurrence of the pains in the stomach, which he

relieved by exciting vomiting, and he fancied there was a lump in his inside, but on several careful examinations no tumour could be discovered in the abdomen.

The tumour on the thigh is situated at the anterior and inner part of the base of the trochanter major, over the outer and front part of the hip-joint and neck of the femur; it is spherical in shape, and about the size of a cricket-ball, partly irregular on its surface, very hard and solid, and only partially movable, and seeming to have a wide basis. The head of the femur rolled freely in its socket, but the presence of the tumour interfered with the motions of the joint in flexion and extension.

Under chloroform a free vertical incision was carried along the entire extent of the tumour, viz. five inches, so as to expose the tumour; this latter appeared nodulated, and was of pearly whiteness on the surface, and enveloped in a dense capsule, which was adherent in part to the adjacent textures, so that it required several sweeps of the knife to clear it therefrom; the base of the tumour, however, was found firmly attached to the periosteum of the trochanter, the neck of the femur, and anterior capsule of the joint, so that in separating the tumour from these a portion of the capsule of the joint was shaved off, and found incorporated in the tumour itself; some distinct synovial fluid escaped, thus confirming the accidental opening of the joint.

The wound was closed, and the limb maintained at perfect rest. No symptoms of articular inflammation supervened, although there was considerable suppuration from the wound itself. All his ailments were referred to the stomach and region of the liver. He suffered much from pains in the præcordia, irregularity of the bowels, dyspepsia, and frequent attacks of diarrhœa. There continued copious discharge of puriform fluid, mixed with synovia, but this gradually lessened, and at the end of eight weeks the wound became for the most part closed and covered with new skin, leaving an oval space of three inches long and three quarters of an inch broad, beset with pale flabby exuberant granulations, discharging some creamy pus. In the centre of the granulations, however, there was a small aperture, from which flowed freely a yellowish-red fluid, about two or three drachms, whenever the hip-joint was moved. This quantity could be collected almost at any time; it became solid and yellowish-white on boiling. This escape of synovial fluid eventually subsided

at the end of three months, when the wound entirely healed up. He gradually gained strength; could flex his thigh at right angles to the pelvis without causing any pain or inconvenience; the motions of the joint were perfectly free and uninjured. The extensor muscles of the toes were apparently paralysed, and seemed to be becoming atrophied. He was able to get about and could walk pretty well with the aid of a stick, and he left the hospital at the end of five months, with returning motion and use of his extensor muscles.

Remarks.—The growth was considered to have arisen from the base and front of the trochanter major, and hence the operation was undertaken; however, it proved that the tumour was intimately connected with the capsule of the joint, and although the knife was kept close to the enchondromatous structure, yet the hip-joint was opened; and this could not possibly have been avoided unless a portion of the broad base of the tumour had been left behind. The protracted and tedious recovery after the removal of the tumour is mainly to be attributed to the wounding of the capsule of the joint, although the man's general health had much to do with the great want of repair. The low state of his vitality, and the presence of some inexplicable internal derangement, may perhaps account for his escape from the perils of a wounded hip-joint, viz. acute inflammation, suppuration, and its evil consequences.

The section of the tumour gave the ordinary characters of a cartilage growth; there were no traces of ossification. Part of the capsule of the joint was found imbedded in the posterior walls of the tumour. It would be advisable in all simple growths connected with capsules of joints, to preserve the joint entire by slicing off the tumour [on a level with but external to the capsule, although it would involve some of the growth being still left behind.

CASE 4.—*Fracture of exostosis growing from shaft of femur; acute synovitis; reconsolidation; subsequent removal of exostosis.* (From notes by Mr. Rawlings.)

John P—, æt. 25, a fishmonger, residing at Limehouse. Admitted into Job Ward on December 20th, 1866, under the

care of Mr. Poland. Has always enjoyed good health, except at times when his knee and thigh have troubled him. When he was about ten years of age a small hard swelling appeared at the inner part of the lower end of the left thigh, springing from the upper and inner part of the condyle of the femur ; it was above the joint, though situated close down to it. It grew slowly, was very painful at times, and interfered somewhat with the motion of the limb. He went to St. Thomas's Hospital, and under chloroform a bony tumour (1¼ inches long) was removed by the saw. He recovered, and left the hospital in about five weeks. About one year subsequently, that is, about eight years ago, the tumour commenced again to grow, and in two years attained its present size, and no subsequent increase ensued. It had been painful at times, especially with change of weather; yet he has been able to walk and run as well as other persons, and even after a hard day's work the pain has not been increased.

On the day before admission he fell down and struck the site of this tumour ; he instantly experienced great pain in that situation, so that he thought he had broken the lump. The pain grew worse, swelling of the knee took place ; he could not move his leg at all ; had no rest during the night.

On admission late in the evening of the 20th of December he had great pain in the left knee, which was hot and swollen. On moving the patella, a crepitating sensation was detected between it and the femur. Just above the inner surface of the internal condyle was a limpet-shaped (or bluntly cone-shaped) tumour, two inches long, one and a half inches broad, and about an inch high. It was hard, nodulated on the surface, and very tender when rudely touched. As the patient was suffering from acute synovitis of the joint, twelve leeches were applied, and the limb placed in the straight position on a splint. The leech-bites bled very much, so that the dresser was called at midnight to staunch the hæmorrhage. On the following day he was much relieved, and an ice-bag was applied over the joint.

The joint became easier, but the site of the tumour, especially in the direction of the internal condyle and lateral ligament of the knee-joint, was very tender, and the surface of the skin over it very hot. There was no longer any crepitation in the joint when the patella was moved over the femur. Subsequently the tumour seemed to be found a little moveable, but no crepitation

could be detected. He could not move the leg without great pain.

The joint became perfectly sound and natural, and he was able to walk about with the aid of a stick. He was recommended to leave the hospital, and to apply again for admission when his health was re-established, so as to have the growth removed.

In the course of a month he returned to the hospital as desired, but stated that he had not been able to use the leg so freely as he formerly did before the accident, and attributed this to the altered position of the growth ; he could not get his living in consequence. The bony tumour could now be more freely handled and examined, as the knee-joint was perfectly healthy, and free from pain and inflammation. It was of the size of a pigeon's egg, and quite fixed to the internal condyle of the femur. Mr. Durham removed the exostosis. There was no difficulty in the operation. The exostosis was of mushroom shape. It was easily separated from its attachment by cutting forceps. The pedicle was exceedingly short, and had a diameter as large as a fourpenny piece. Some slight synovitis of the knee-joint followed, which was combated by the application of ice bags, so that at the end of a month he left the hospital perfectly cured.

Remarks.—This case is introduced in consequence of several unusual facts in connection with it ; and, firstly, the very rare occurrence of a fracture of an exostosis produced by external violence and its subsequent re-consolidation. Mr. Birkett in his article on Exostosis in the ' Guy's Hospital Reports ' for 1868, vol. xiv, p. 504, alludes to this accident in the following words : " The fracture of an exostosis from the base upon which it grows is a circumstance of such rare occurrence that I am induced to cite a case recorded by Gosselin. In this instance the exostosis was of the left femur, and had been broken off by a blow inflicted with a rough piece of stone, which at the same time made a small wound, from which there was a considerable effusion of blood. It became implanted on the femur by two points. For further particulars, see details of the case in op. cit.

The second point to which attention is to be drawn is the fact of the broken-off exostosis wounding the synovial membrane of the knee-joint by puncture, as evidenced by the immediate swelling and inflammation of the joint, intense pain and sleepless

nights. Although seen on the following day, the broken-off piece of bone could be felt with difficulty owing to the effusion; but it was decidedly loose, and a question arose as to the propriety of cutting down upon it and removing it at once; but it was considered highly dangerous to adopt such a proceeding in the then inflamed state of the knee-joint and its probable wound. This would risk the setting up of suppurative action, and its attendant evil consequences. It was, therefore, deemed prudent to allow of the subsidence of the acute synovitis and complete recovery of joint before resorting to the removal.

The third point in this case is the rapid reunion of the exostosis to its root by the end of the eighth week, when it was eventually removed with safety, although some slight synovitis supervened.

CASE 5.—*Tumour of the neck in connection with the thyroid gland; removal; structure thyroidal; recovery.*

Mary D—, æt. 43, married, and has had eighteen children, the youngest being three years old. She has always had good health. Was admitted into Guy's Hospital, under the care of Mr. Poland, on May 4th, 1870. She stated that she had had a small swelling in the neck for twenty-six years, which she attributed to the result of a pinch she then received; this enlargement increased but very gradually until about one year back, when it began to grow more rapidly, and soon attained almost double its former size.

About six weeks ago she perceived a hard knot in the lower part of the swelling, which caused some pressure on the windpipe. She also remarked that the tumour had "dropped" a little lower down the neck than it was before.

On admission the tumour occupied the front and right side of the neck over the situation of the right lobe of the thyroid gland; it was of the size of a shaddock, but somewhat ovoid in its lateral aspect. It measured four inches and a quarter in its vertical direction, and about five inches transversely; it felt solid, but at the same time elastic; was readily moveable under the integument, uniform on its surface; was considerably harder at

sation; pulse 126. There was considerable distension of the neck around the site of the wound, and a thin reddish discharge issued therefrom. The sutures were immediately removed, and the wound fairly laid open by a blunt probe, giving exit to a large quantity of serous fluid. This was followed by immediate relief. The respiration in both lungs was free and equable.

She still suffered from great distress, and her rest was disturbed by a continual cough, with endeavours to expel mucus. Her swallowing was also considerably affected, and she was often obliged to sit up in bed, leaning forwards. The pulse was feeble, about 120 to 130.

On the eighth day febrile symptoms set in, and an inflammatory swelling appeared at the back of the neck. This in the course of a few days suppurated, and was laid open. From this time she began visibly to improve, slept better, and could lie down in bed with ease and comfort. She was able to take fluid nourishment, but only in sips, and had to swallow with effort and slowly. Previous to this enemata of beef-tea, &c., had to be administered. She slowly and gradually recovered; her voice became more natural, and had lost its hoarseness; she could speak better and swallow pretty freely. The wound was not quite closed.

She left the hospital for the country seven weeks after her admission, on June 22nd, 1870.

On following up this case, and making inquiries of the medical practitioner who sent the woman to Guy's Hospital, I received the annexed note which fully details the subsequent and present condition of the patient.

"Boston; *Dec. 8th,* 1870.

"Dear Mr. Poland,

"I saw Mrs. D— this evening; she was looking about the same in figure as she did before she left this town for the hospital. She told me that she was very weak up to six weeks after reaching home, when in a fit of 'coughing' something broke in her throat, and she got up nearly a chamberful of blood and corruption. The wound discharged for ten weeks, when she perceived something like a fleshy string in the wound, which she seized with her fingers, and drew it out; it resembled a skein of whity-brown thread doubled up, and about six inches

long. The wound healed immediately afterwards, and she has gained in flesh and strength ever since.

"A dense, cord-like cicatrix remains, which somewhat impedes the movement of the chin, &c., and of which she complains. The right and left lobes of the thyroid gland can be felt, as well as the isthmus. There does not appear to be much loss of substance; the right lobe is not so readily felt as the left, but there is not much difference. There is tenderness on pressure over both lobes, but more so on the left. She has still a slight hoarseness.

" I have preferred to give you as nearly as I can her own statement of convalescence, as you can appreciate best its value.

<div align="right">" Yours faithfully,
" W. G. Pilcher."</div>

Description of the tumour and its connections.—The smooth globular tumour, during the operative proceedings for its removal, appeared to be surrounded and encapsuled by a moderately dense investment of connective tissue, with the exception of one part only, namely, at the posterior and inner surface, where there was some firm attachment to the adjacent structures. This attachment, which may be called its pedicle or base, had to be divided by the knife, and was followed by copious hæmorrhage, thus showing that it had a vascular connection. All attention being directed to the control of hæmorrhage, the operator unfortunately omitted to study and observe the exact condition of the structures involved by the tumour, more especially the state of the right lobe of the thyroid gland, and thus to ascertain, if possible, the seat and origin of the tumour.

The growth weighed thirteen ounces, and measured four inches in diameter by three inches and a quarter.

On section the tumour presented a dense thickened capsule, like the tunica albuginea of a testicle; it invested uniformly the whole circumference. There were no well-marked septa passing through its interior. It was for the most part solid, and contained some patches of osseous matter; its appearance was much obscured by hæmorrhage in the structure; however, here and there were blood-cysts, and on pressing some of the spongy portion distinct cysts were visible.

The tumour underwent severe scrutiny, and the following details of the investigations made by different and accurate observers may not be thought out of place. The slight variance in the description is due to the examination of different parts of the same growth.

The surgical registrar, Mr. Rendle, thus records his observations :—The contents appeared to be divided into compartments containing reddish clots, flaky reddish fibrine, discoloured clot, easily broken down, and red granular substance, easily detached from a clean cyst-wall. There were questionable traces of thyroid gland-tissue. Under the microscope fine delicate fibres were seen, as also numerous cells, of the size of colourless blood-cells in various stages.

Mr. Davies-Colley made an examination of the tumour, and his notes, made at the time, were the following :—Section of the tumour solid ; the greater part was filled with yellowish, firm, gelatinous structure, rather laminated, and like a blood-clot ; there was a mass, in one part, of red spongy substance ; it looked like thyroid gland-tissue. The tumour seemed composed of indistinct lobules ; cysts were visible on pressing a small portion of the spongy part. Under two third object-glass the surface of the cyst-walls had rather the appearance of epithelium, but very indistinct. The other elements of the structure were connective tissue and many vesicles.

Dr. Moxon's Account.—Specimen examined seven months after removal. The outer part of the tumour for the depth of half an inch to an inch is composed of concentrically-disposed fibrous tissue, becoming looser towards the middle of the growth, the fibre-bundles separating and inclosing spaces. These are generally filled with a firm substance, like colloid matter in quality, but some of them contain blood. It is only in some parts of the central portion that the real structure of the tumour can be discerned. The rest is defaced by hemorrhage. The part where the original structure remains shows tissue, as in the accompanying drawing ; and one can easily and certainly recognise the likeness of thyroid tissue, with its regular areolæ, and with distinct walls lined by a cellular interior

layer, in the midst of which a gelatinous matter is commonly imbedded.

Fig. 1.

Remarks.—The foregoing case, which we have thus somewhat elaborately detailed, offers much material for investigation and consideration by the pathologist, as well as by the surgeon. We cannot enter into a minute disquisition upon the subject, as it is one by far too intricate and extensive, and would occupy much space. The whole question of diseases of the thyroid gland and of tumours associated with that gland, in connection with surgical interference, has not undergone that careful and thorough scrutiny in our English surgical literature which one might have desired. There are plenty of materials which might be collected and arranged in reference to these points, and it is to be hoped that at some future time these may appear before the public. Diseases of the thyroid gland have of late been brought into more prominent notice by *Virchow*, in his third volume on ' Die krankhaften Geschwülste,' under the article, " Struma der Schilddrüse." *Albers*, some years ago, published a very valuable and practical account of diseases of the gland, in his 'Erläuterungen' of an Atlas of Pathological Anatomy;

the lower part, the only place where she felt pain, and had an indistinct fluctuation at the upper and back part.

The tumour moved with the larynx, and was seen to glide up and down at every act of swallowing, showing that it had some connection with the structures about the larynx and trachea ; it could not be raised off these parts. The sterno-cleido mastoideus muscle was pushed outwards, and the larynx and trachea slightly to the left of the median line. It was not pulsatile.

She complained of difficulty in swallowing, at times more so than at others, but could take solids and fluids equally well. The respiration was somewhat affected ; the voice very hoarse, so that she could not speak plain ; had great difficulty of breathing when she lay down, and would sometimes suddenly jump up with the sensation of impending suffocation ; she had a hacking, irritable cough ; no sickness or vomiting. She had a sallow look, and pinched condition of countenance. Heart's action normal.

As the tumour presented an obscure sense of fluctuation and a degree of elasticity, it was decided to explore the part, and thus, if possible, to ascertain the precise nature of the growth, and if found to be a cyst tightly bound down to the thyroid, or an enlarged thyroid vesicle, to empty out its contents. A trochar and canula were, therefore, introduced, and about one ounce of purely arterial blood was drawn off, the whole of which almost immediately coagulated. This did not appear to come from a cyst, but from the solid tissue of which the growth seemed now to consist. The growth was thus considered to be one of local hypertrophy of the outer part of the right lobe of the thyroid gland.

The patient became very anxious to have some relief from her very distresssing symptoms, especially the sensation of sudden suffocation. After several consultations it was agreed that the tumour should be fully laid bare and incised, and that should its entire removal seem feasible it was to be done ; but should the connections be firm at the back and inner part of the tumour, then a large wedge-shaped slice should be cut out, so as to relieve tension, and possibly to lead to partial enuclea-tion of the tumour, by the application of strong astringents and escharotics.

Under chloroform a vertical incision, about six inches long,

was made over the central part of the tumour, cutting through the deep fascia and some muscular fibres, when the tumour came forwards from between the receding edges of the cut integuments. It looked glistening, and of a bluish colour, and perfectly smooth, and put one very much in mind of the exposure, by incision, of a diseased testicle previous to its removal by section of the cord.

This first incision had not only laid bare the tumour, but had made a considerable gap into the structure itself, and, to one's great surprise, no hæmorrhage followed, although one was fully prepared to arrest this by heated irons. The growth apparently resembled some fibrous development. The hand was now readily introduced between the tumour and external parts on both sides, and the whole mass could be separated without any force whatever, with the exception of the posterior and inner part, where there were some firm adhesions. These were not very extensive, and by careful sweeps of the knife kept close to the walls of the tumour these were divided, and the tumour rolled out of its bed. But immediately a considerable quantity of blood welled up from the bottom of the wound, and after some little delay two or three small arteries were twisted, and one large vessel secured by ligature; not much blood, however, was lost. The tumour did not seem to have any direct pedicle of a distinct character, but rather an adhesive connection with the side of the thyroid gland. It was not the right lobe of the thyroid. The omo-hyoid was found lying loose in the wound, and the carotid could be seen pulsating freely, but quite out of harm's way.

The patient bore the operation pretty well; but at the time of the section of the adhesion and hæmorrhage she became very pallid, and afterwards blue; but this might have been due to chloroform. The pulse was small, and about 70. She, however, soon rallied, and was carried back to the ward.

The wound was left open for the space of three hours, and after the arrest of some slight secondary hæmorrhage the edges of the wound were brought together by sutures and strapping; a light compress applied over the whole.

Some slight constitutional irritation supervened, pulse 100, and want of sleep; respiration about 26 per minute.

On the third day she was attacked with a sudden choking sen-

and again, *Gurlt* has entered most minutely into cyst tumours of the neck, and those associated with the thyroid gland; he has tabulated a very large number of cases according to the treatment adopted for their cure. However, we cannot enter further into the subject, but only make such few remarks as may be found applicable in explanation of our case.

The first question which we have to consider is " whether the tumour was or was not a simple tumour of the neck, or perhaps an enlargement of one of the cervical glands, undergoing changes simulating disease of the thyroid gland, and yet able to be excised without any of those attending dangerous consequences usually present in removal of true thyroidal growths ?"

Previous to the removal of the tumour, the following were the external evidences as to the probabilities of its being a thyroid growth: the situation of the swelling being at the site of the right lobe of the thyroid gland, and its attachments to the trachea and larynx, and encroachment upon the pharynx and œsophagus; its close contact with and overlapping of the gland itself; its moving up and down with the larynx, at every attempt to swallow; its apparent solidity, and its giving exit to pure arterial blood on exploration. These collectively gave such striking evidences as to its being a thyroid tumour, and so fully impressed the surgeon with that idea, that there was some pause and hesitation as to the advisability of its removal. But then, on the other hand, the tumour had such extreme mobility, it rolled about under the integument, and could almost be isolated from the parts beneath, that it seemed almost a pity not to embrace such tempting opportunities for relieving a distressed patient of a weighty incumbrance, merely because it was assumed to be thyroidal; for it might prove after all to be a simple growth attached to that body, and capable of removal without danger to the life of the patient. The operation was performed, and the tumour turned out with an ease scarcely anticipated; it is true there were some firm adhesions and good vascular supply, yet these adhesions were divided without involving any vital structures, and the hæmorrhage was readily restrained. Under such condition of things we thus naturally supposed the tumour to have been unconnected with the gland; but we had now to place the tumour under strict investigation as to its nature and character, and we

can safely affirm that the tumour had most convincing proof of a decidedly thyroidal structure; the general appearance on section, and the microscopical examination made by Dr. Moxon, leave us no doubt upon the matter. But it may be asked, Cannot a simple tumour or gland, in the neighbourhood of the thyroid gland, and supplied by the thyroidal arteries, take on a thyroidal structure? This would seem to be against all physiological reasoning, as one would expect that a tumour, to have thyroidal elements, ought to be in association with the gland structure itself. However, we shall allude to this point further on.

Being thus clearly satisfied that the growth in question was essentially thyroidal, let us now consider briefly its source and origin. Was it the right lobe of the gland itself? or was it a diseased condition of an outlying portion of the gland substance? or was it one of those unusual growths in connection with the thyroid gland, termed thyroid ganglia, accessory thyroid glands, &c.?

1. *Was it the right lobe of the gland itself which had taken on diseased action?* Now, although previous to the operation the right lobe could not be discovered, in consequence of the tumour occupying its place and overlapping it, if existing; and although after the removal of the tumour the operator had neglected to ascertain its presence, yet the sequel of the case fully demonstrated that the right lobe was still existing, for the report of the case, six months after the operation, states that although the right lobe could not be felt quite so readily as the left, still there was no great difference between the two lobes.

2. *Was it a morbid growth attacking an outlying portion of the gland substance,* there increasing in size, and forming a bed for itself, sustaining itself from the vessels of the parent gland, and afterwards maintaining a separate existence? This explanation seems to be the most plausible one, and would readily account for the easy enucleation of the tumour. In support of this view we have brought into notice a preparation in the Museum of Guy's Hospital, marked No. 1711[45]. There is no history attached to the specimen, it was taken from a body in the dissecting room. Dr. Moxon has made a sketch of the same, and has kindly permitted me to make use of it. The drawing exhibits on a miniature scale the precise conditions which we consider existed

in our case. There is a small tumour of the size of a large grape, hanging down loosely by a pedicle attached to the lobe of the thyroid gland, and in which latter gland there is a well-marked cup-like depression, from which this tumour had fallen out. Now, if this tumour had grown to a large size, and remained in its bed, it would represent exactly the present case.

Fig. 2.

Moreover the pedicle in this preparation consisted mainly of a large vessel, emerging through the gland substance, and derived from one of the large thyroidal arteries supplying the lobe. The growth had a partly ossified capsule, and it consisted of a cystic portion and a solid substance, which latter under the microscope was found to be precisely similar in structure to that above described.

This form of disease seems closely to resemble the intra-cystic growths of the breast, and Mr. Paget in his 'Lectures on Surgical Pathology,' 3rd edition, 1870, p. 380, thus makes direct

allusion to such when referring to cystic tumours of the breast: he says—

"Now a near parallel with the history of these mammary tumours is presented by the observations of Frerichs and Rokitansky, on the intra-cystic growths which occur within the substance of enlarging thyroid glands, *i.e.* of increasing bronchoceles. In these, masses of new-formed thyroid gland tissue are found imbedded and enclosed in coverings or capsules of connective tissue, within the proper though increased substance of the gland."

3. *Was the tumour a diseased condition of an abnormal process or prolongation of the thyroid gland* occurring at the side of the right lobe? We do not feel disposed to admit this explanation; the only fact in favour of such an assumption is the circumstance that the patient had observed the existence of a swelling at the side of the neck for twenty-six years, but from its being small and giving no inconvenience took little notice of it. These processes and natural outgrowths from the gland are by no means common; they generally occur as an extra lobe in the median line above the isthmus of the gland. Morgagni describes this under the name of Processus pyramidalis, as an outgrowth or appendage of the gland, extending upwards to the os hyoides. Virchow in his elaborate treatise, ' Die krankhaften Geschwülste,' Band III, Hälfte 1, p. 11, and in referring to diseases of the thyroid gland, remarks that this process may become fully developed, and that its connection with the middle part of the gland may be degenerated into a thin thread, or may be entirely absent; that this pyramidal process may be the seat of hypertrophy or partial struma, and thus apparently having no connection with the gland. This disease he terms Struma accessoria—Nebenkropf, and refers us to Albers' ' Atlas of Pathological Anatomy,' Plates 25, 26, and 29. Virchow also directs attention to the fact that at other parts of the thyroid gland there may sometimes be found isolated lobes, separate from the gland itself, gradually becoming developed, and eventually forming growths. Among these he mentions some which have been observed at the posterior borders of the lateral lobes, assuming a tuberculated form, and often pressing upon the œsophagus, as shown in Plate 25, fig. 9, of Albers' work.

Albers, in the second volume of his explanation to his plates, and at page 364, makes especial reference to a peculiar form of disease under the names of " Ganglion Kropf," " Ganglion Glandulæ thyroideæ," " Struma gangliosa." He says it consists in the formation of a fibrous swelling which springs from the thyroid capsule and becoming enlarged in all directions, involves the parenchyma of the gland on one side, seldom developing itself externally. It gradually attains the size of an apple, acquires a hard consistency externally, and is separated from the gland substance by distinct limits. This definition seems very much to approach to the details of our case.

4. *Was it an accessory thyroid gland which had taken on diseased action?* Although this was suggested by some, we can hardly arrive at the same conclusion. The case does not at all resemble those which have been recorded as such.

Paget thus refers to the subject of accessory thyroid tumour: " These growths of new gland-tissue may appear not only in the substance of the enlarging thyroid, *but external to* and *detached from the gland.* Such outlying masses of thyroid gland are not rare near bronchoceles, lying by them like the little spleens one often sees near the larger mass." At page 569, under the heading of " Thyroid Glandular Tumours," he further remarks:

" Their history is merged in that of Bronchoceles (see Virchow, Lect. 22), with which they are usually associated, whether imbedded as distinct masses in the enlarged gland, or lying close by it, but discontinuous. In appearance, both to the naked eye and under the microscope, they have a strong resemblance to the structure of the normal thyroid gland. But they are very apt to exhibit an abundant cyst-formation in their interior, which is due to a dilatation of the gland vesicles, which become filled with a more or less gelatinous material."

Mr. Paget gives the detail of Mr. Stanley's case of removal of a tumour from the neck of a woman, æt. 62. It had been observed for fifty years, for the first thirty of which it was like a loose " kernel " under the skin, and scarcely increased. In the next ten years it grew more quickly, and in the next ten more quickly still; and now the skin over it ulcerated, and it protruded and occasionally bled, but was never painful. It looked like an ulcerated sebaceous cyst, seated upon the subcutaneous tissue at the lower part of the neck, just in front of

the trapezius. No cause could be assigned for it. Its section on microscopical examination gave the appearance of a piece of broncbocele.

Mr. Paget says, I have seen no other tumour like this, nor any material texture that it resembled, except the thyroid gland, and it is probable that it was produced by an enlargement of one of those isolated accessory portions of thyroid gland substance which one sometimes sees detached from the main body of the gland.

CASE 6.—*Encysted hydrocele ruptured by blow into the tunica vaginalis, simulating hæmatocele.*

James G—, æt. 64, a lighterman, admitted into Guy's Hospital on September 15th, 1870, under the care of Mr. Poland. The man gave a very imperfect history of his complaint, but the following facts may be relied upon. He has never had syphilis. About twelve years ago he fell astride a beam of timber, and injured the right testicle, and was laid up for three weeks; he recovered, and felt nothing more of the accident. About three weeks back, whilst launching a boat, his foot slipped, and he fell across the iron stern of the boat, injuring the testicles, suffering acute pain; he sat down for an hour, when the right testicle began to swell so rapidly and the pain thereof was so intense that he was obliged to go home. He applied bran poultices, and kept at rest; this reduced the swelling considerably, and he became easier, so that he was soon able to do some work, although the testicle was still swollen. However, he got rapidly worse, and came to the hospital.

On admission the scrotum on the right side was distended to the size of an ostrich's egg, and was globular in form, approaching to a pyriform shape; it was remarkably tense and elastic, and gave obscure signs of fluctuation in consequence; the lower and back part felt hard, and was here exceedingly painful, the pain running along the spermatic cord to the inguinal canal. The integuments were thickened, and of a darker colour than natural, like a recent bruise. There was no tenderness in the tumour itself, and it was not in the slightest degree transparent; it felt very heavy.

From the history of the case, the absence of transparency, the weight of tumour, &c., it was considered to be an ordinary case of hæmatocele.

But in order to decide matters, it was explored by means of a trocar and canula, when sixteen ounces of white, turbid, milk-like fluid was drawn off. This fluid under the microscope contained large quantities of spermatozoa. The testicle itself was found to be very slightly enlarged. He left the hospital shortly afterwards, and was lost sight of; he considered himself cured.

On interrogating the man after the operation, he recollected that he had been tapped once, prior to his recent accident, for a lump in his testicle, but could not state the quantity or quality of the fluid removed. The lump, however, returned, and he might have struck this when he fell across the boat.

The case, therefore, may be fairly described as one of encysted hydrocele ruptured into the tunica vaginalis.

CASE 7.—*Cystic myxoma of the testicle ; removal by excision.*
(From notes by Mr. Talbot.)

Edward C—, æt. 36, coal whipper, living in Rosemary Lane, Bermondsey, admitted November 9th, 1870, under Mr. Poland, in Job Ward.

Eighteen years ago he had a discharge from the urethra, a venereal sore and bubo, but never had a sore-throat or eruption. About two years back he had pains in the joints and bones, and had to lay up two or three times in consequence of his inability to use the legs.

About twelve months ago he noticed a swelling in the right testicle, which was attended with no pain ; he does not remember having met with any injury to the part ; the enlargement increased for three months, was then tapped, and some fluid evacuated. Since then he has undergone paracentesis every two months ; the fluid drawn off was each time less in quantity; the last time, leaving the tumour of a more solid character, was about two months ago, and a clear watery fluid was drawn off. However, the fluid re-accumulated, and the whole tumour formed a considerable enlargement on the right side of the scrotum.

On admission the right side of the scrotum was occupied by a large tumour of the size of two fists; it was hard and solid at the inner and upper part, as also in front, but at the outer part and behind it was elastic and fluctuating; one large cyst seemed to occupy the front part below, and several smaller cystiform elevations could be traced on the outer circumference. However, the solid constituents of the tumour appeared to form three quarters of the tumour. There was no translucency by transmission of light; the body of the testicle could not be recognised; the whole tumour seemed to be limited to the scrotum, was more or less globular in shape, and uniform on the surface, with the exception of the nodulations caused by the cystiform character of the exterior. The cord was perfectly natural, and the inguinal canal quite free; there were no enlarged glands in either groin, and the left testicle was quite healthy.

The skin of the scrotum was not involved, but the veins were enlarged and turgid.

As regards testicular pain, it is stated to have been normal on pressure at the lower and front part of the tumour.

November 15th.—Under chloroform a vertical incision was made along the anterior surface of the tumour, care being taken to avoid wounding the sacs, for the purpose of afterwards injecting the tumour. The whole of the testicle was found involved in the disease, and was therefore enucleated; the cord was transfixed by a double ligature and firmly tied, and the tumour then removed. The wound was united by sutures, and the ligature left out at the upper part of the wound.

The patient never had a single bad symptom; the parts united by first intention, and the ligature came away on the fifteenth day. Water dressing was the only application made use of.

DESCRIPTION OF THE DISEASE, BY H. G. HOWSE, M.S.

Cystic myxoma of the testicle.

After removal, as described in the above report, a fine trocar was introduced into one of the largest cysts, and a quantity of clear liquid drawn off. This liquid on the addition of spirit coagulated into a flaky material, which, viewed under the

microscope, presented a partly fibrous, partly granular appearance. The coagulum placed in water only very partially redissolved. The fibrous material seen under the microscope was probably coagulated mucin, the granular, albumen; such being the usual difference observed in the mode of coagulation of these two substances.

The vessels of the tumour were next filled with fine Prussian blue injection through one of the small arteries running in the course of what was originally the cord. It was then hardened in spirit and a vertical section cut. The surface of the section was found very unequally injected in different parts. This may have been partly due to only one vessel having been injected; partly also in all probability to the very different structures of which the growth consisted. Roughly the various parts seen over the surface may be divided into (1) the cysts; (2) a very vascular part; and (3) a colourless nearly evascular portion.

(1) Cysts. Two or three of these presented themselves for examination. Two were of very considerable size, capable of containing an ounce or so of fluid; the others were smaller. They all contained a fluid similar to that already described, but one of the larger ones was also filled with a considerable coagulum of blood. This probably accumulated there after a tapping done before the operation.

(2) The vascular part. This was deeply coloured with Prussian blue, and microscopically presented several tissues. (*a*) The bulk of the growth consisted of very fine interlacing bundles of fibroid tissue, similar to that usually seen in mucous growths. (*b*) In intervals of the above, lobules of true adipose tissue were found; these were generally small, the largest being not more than a quarter of an inch across, but they were very numerous, especially in one part of the tumour, where they were clustered quite closely together. The fat-vesicles of which each lobule consisted were as well developed as in the healthiest normal adipose tissue. (*c*) The fibroid tissue described above alternated in one or two parts with spindle-shaped cells; these, however, were small, and but sparingly developed.

(3) The evascular part. This was found in one or two rather largish knots (one half to three quarters of an inch across), on the lower part of the tumour. Microscopically it consisted of small cells, crowded closely together; these were undergoing

commencing fatty degeneration. These evascular knots were separated by tolerably sharp lines of demarcation from the vascular portion of the tumour.

Remarks by Mr. Howse.—I have called the above tumour a cystic myxoma of the testicle, because I believe such to have been the growth from which it originated. It must be evident, however, that it is by no means a pure instance, but rather one containing many of the histological elements of a sarcoma and a lipoma. The occurrence of fat, however, is not at all remarkable, myxomata having a great tendency to change into true adipose tissue, some of our largest fatty tumours taking origin in this way. I need only refer to one weighing fifty-five pounds (Preparation No. 2456[10], Guy's Museum), removed post-mortem from the abdominal cavity of a woman by Mr. Forster, which was examined microscopically by Dr. Moxon, and proved to originate from a mucous growth. The mode of production of the fat is easy to make out in these tumours. In the interspaces of the fibroid tissue small round cells occur in variable numbers, sometimes very plentifully, sometimes only very sparingly. In the part which is about to change to fat they are generally found pretty abundantly. The first alteration in them is that they become granular, then they begin to distend, and finally become converted into the perfect fat-vesicle. This change is easily watched in the small fat-lobules, where numbers of the small, only partially altered cells will be found. It is, however, necessary to examine the thin sections in water, for strong glycerine renders the young cells so transparent, that the change is not readily discovered.

The fibroid tissue of which this growth was mainly composed bears a very close resemblance to that forming ordinary connective tissue. It is not, therefore, at all wonderful that in certain parts of the tumour other elements ordinarily developed from that tissue should be found. I refer to the spindle-shaped cells. The presence of these structures proves the sarcomatous nature of certain small parts of the growth. To the same category must, I think, the evascular degenerating part of the growth be referred; only this would come under the head of a round-celled sarcoma, and not of a spindle-celled.

No traces of the original gland tissue were found by me, nor do I think any exist; if so, they must be in exceedingly small

quantity in a part of the tumour not examined. It was desired to preserve the growth, and therefore it was out of the question to cut it up in all directions, as an exhaustive search would imply.

I have said that the growth is not an example of a pure myxoma. The nature of the fluid found in the cysts also tends to show this. It contained a very large quantity of a material, which coagulated into a *granular* stuff. Had the fluid belonged to a pure mucous growth it would have nearly all coagulated into a *fibrous* material, the granular basis being only in small quantity.

Growths of the above description in the testicle are excessively rare. I have not been able to find one exactly resembling it. In other parts of the body, however, they are not uncommon. Virchow ('Die krankhaften Geschwülste,' vol. i, p. 430) refers to a single specimen, one of Lebert's ('Atlas d'Anatomie Pathologique,' Pl. cxlix, figs. 3—8), described under the head of fibro-colloid. The description, however, is meagre, and not very satisfactory. Most of the cases of cystic disease of the testicle come rather under the head of cystic sarcoma or enchondroma. Of these we have several examples in our museum.

A CASE

OF

EXOSTOSIS OF THE FRONTAL BONE,

GROWING INTO THE CRANIAL CAVITY.

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BY JOHN BIRKETT.

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OUTGROWTHS of osseous tissue from the bones of the extremities are of common occurrence, but from those of the skull they are fortunately rare.

Those from the os frontis are divisible, according to their texture, into the compact or ivory exostoses, and the spongy or cancellous. The last variety is commonly enveloped by a layer of the compact tissue, more or less thick, and variable at different spots on its circumference.

The first class is perhaps the most interesting as regards the elementary composition and the arrangement of the elements. Comparing very closely with the hardness and densely grained texture of ivory, such growths offer great resistance to the instruments employed for their removal, and, as they may be attached by sessile and broad bases, instances are recorded in which the attempt at excision has proved abortive.

Being, however, attached to the external table of the skull only, their presence is merely unsightly, as, when restricted to that site, they produce no hurtful result.

The site of the origin or starting-point of these exostoses, either of one variety or the other, is a subject of the greatest pathological interest. In a practical view, and with reference to the treatment of any special case, the discovery of the precise

origin of the growth is essential to the ultimate and successful issue of any operation undertaken for its removal.

A description of a sufficient number of cases is on record to enable us to arrange them in four groups, thus :

1. Growths from the outer table.
2. Growths from the inner table.
3. Growths by which both tables are involved.
4. Growths from the diploe, really enostoses.

In Groups 1 and 2 the growth springs from either the one or the other table, and exclusively maintains its primary relations.

In Group 3 the growth seems to spring from both tables, whilst the diploe remains in nearly a normal state.

Whilst in the last group the outer or inner table, or both, may be affected according to the site of the new growth or the disposition it shows to extend itself into the cranial cavity or towards the cutaneous surface.

The reader is here reminded that we are writing of true outgrowths or offshoots from the frontal bone, and that we have intentionally excluded from the series those remarkable and very rarely seen masses of bone of extreme ivory hardness developed in relation with the frontal sinuses. There is some ground for the assumption that such osseous masses do not sprout out from the bony walls of those cavities originally, although, in consequence of the few preparations of those growths in existence never having been completely examined, the existence of a pedicle cannot be positively denied.

When these growths affect the more plane-surfaced portions of the bone they do not cause serious difficulties unless they are within the skull. But there are other parts from which they grow. For example, in the region of the frontal sinuses and orbital processes. Serious complications then arise. The pressure or bulk of the tumour produces obstruction of the passage leading from those sinuses to the nose ; it grows into the cavities of the nose, of the orbits operating upon the organ of vision, and of the cranium ; it encroaches upon the membranes of the brain ; and lastly on that organ itself, causing a deadly effect.

The case to be related showed the complications above adverted to, and, on account of its rarity, deserves to be recorded.

After these brief introductory remarks, we may now proceed

to the details of the case, which were carefully reported by Mr. J. J. Bowes and Mr. J. Lacy Morley.

E. P—, æt. 15, was admitted October 11th, 1869, into Martha Ward. She resided near Ipswich, and was occupied as a domestic servant. She was healthy looking and well nourished. Her previous health had been good, and the catamenia were established. She had whooping-cough, measles, and jaundice in childhood. Two years since she was ill with scarlet fever, for about two months. Some six weeks afterwards her friends noticed a swelling on the forehead; but the girl herself stated that an altered position of the left eye-ball first attracted her attention, and that the frontal swelling appeared subsequently. However, Mr. Muriel informed me that the displacement of the eyeball had existed only about nine months prior to admission into Guy's.

From about four months before the girl came under my observation, we have the description of the case from Mr. Muriel, of Hadleigh, Suffolk, who then saw her for the first time.

He writes: " I was sent for in the middle of the night, and found her insensible. The swelling over the eye was very great, and the eyeball displaced as it now is. She remained insensible for about twenty-four hours. I lanced the fluctuating tumour, and there was a large quantity of thick, gelatinous fluid, which escaped with some difficulty. I kept the wound open for some time, and attended to her general health, which gradually improved. The fluctuation has slowly returned during the last six weeks. I cannot ascertain any history of an injury to the frontal bone."

The girl said that the tumour on her forehead was at first very hard, that poultices were applied to it, and that it varied in size from time to time.

She described the attack of illness for which Mr. Muriel was consulted as " a fit," before which time she had suffered great pain for some days.

A week before admission she had been tormented with pain, extending along the left side of the face and head.

I happened to be in the ward when she first entered it, and in the act of removing the dressings I found some tenacious, yellow, purulent, mucous fluid oozing out of a small opening in

the skin at the site of the inner and upper angle of the left orbit. It pulled out in a long band, was with difficulty detached from the edges of the opening, and was cut off with scissors.

The objective signs on admission were as follows. (Plate I.) There was a considerable swelling above and below the left eye-brow. Tracing it from above downwards it seemed to arise uniformly from the anterior surface of the frontal bone. A little to the right of the mesian line, midway between the hair and root of the nose, a ridge could be felt. It was traceable outwards for about an inch, and then it curved downwards. Tracing the finger upwards from the nose another ridge was perceptible. Passing the finger outwards along the eyebrow hard elevations were felt, and she complained of any pressure at the outer termination of the eyebrow. Above the eyebrow, just to the left of the median line, there was a small scar result-ing from the lancet wound, before described. Below the eye-brow a sharp margin of bone could be felt projecting downwards, and blending to the right with the root of the nose.

The left upper eyelid was depressed, and could not be per-fectly raised, and the fissure between the lids inclined obliquely downwards and outwards.

The left eyeball was on a lower plane than the right. It was also everted. The axis of vision, instead of being at an angle of 90 degrees, represented one of 120.

The veins on the surface of the upper eyelid were dilated and the cutaneous surface congested.

The centre of the tumour seemed to cover the site of the left frontal sinus, its periphery extending, however, considerably beyond its usual limits. It spread into the angle of the orbits, on both sides of the root of the nose, but projected most into the left. These two orbital prominences did not feel very hard. In the centre of the frontal swelling fluctuation could be felt, although indistinctly, and as if the fluid were confined beneath a tense fibrous membrane. A bony unyielding ring encircled this softer and elastic centre.

My first impression, after a careful examination of this tumour, was, that it depended upon the formation of a growth of bone. But after watching the case a few days, and taking into consideration the remarkable mucous characters of the

fluid which escaped from the opening at the inner angle of orbit, together with the sensation of fluctuation in the centre of the swelling, I felt inclined to attribute it to an accumulation of mucus in the frontal sinus, due to obstruction of the canal which leads therefrom into the middle nasal chamber. The pressure exerted by the retained fluid would give rise to absorption of the anterior wall of the frontal sinus, and thus the central fluctuation felt in the swelling might be explained, as well as the lateral expansions of the sinus perceptible in the orbits. There were no other outgrowths of bone to be discovered anywhere.

We shall discover by the sequel of the case that both the conditions above stated did in reality exist, although there can be, I think, no doubt to which to give the precedence.

The treatment at first ordered was chiefly directed to the general health, and water-dressing was applied over the swelling.

During the first week she was in the hospital she did not complain of acute local pain, but only of general headache. The swelling slightly increased at the inner angle of the *right* orbit.

For about a month I refrained from any cutting operation. As the girl did not suffer, I was anxious to watch the progress of the case, and by repeated examinations I hoped to arrive at some method to obviate the necessity for one. Only very slight. enlargement of the swelling took place; the opening in the skin had healed, although some redness remained around it; and the girl complained of rather more pain. Her general health continued good.

In the middle of November, the 16th, chloroform was given, and I made a vertical incision about three inches long over the centre of the tumour, and through the scalp tissues. Reflecting the flaps of the integument externally, I exposed a fibrous structure covering the space bounded by the bony margins of the frontal bone. Cutting this membrane vertically I exposed a hollow filled with ropy, tenacious fluid, precisely similar to that which came away on the day of the girl's admission through the opening in the skin. Clearing this away, I saw a bony fossa lined with mucous membrane. On this account it was clear I had opened a frontal sinus. Hoping to be able to remove a growth of bone from this hollow, I used a gouge and

elevator, and with them I cut and broke off some pieces of bone. Their texture was soft and spongy, although their outer surface was smooth, and formed of a thin layer of compact structure. Being disappointed at not finding a growth of ivory-like bone such as in some cases has been met with in this region especially, and seeing no means of taking away the bone without exposing the contents of the skull, for it was quite clear I was working at the posterior wall of the frontal sinus, I gave up proceeding further. Before closing the wound, however, I tried to pass a fine probe into the nasal cavity and met with insuperable difficulty. The edges of the cut integument were adjusted with a fine suture, and water dressing was applied over the forehead.

On the day following, the girl complained of pain during the past night, which had, however, diminished. She had slept a little. There was slight elevation of temperature generally.

The third day she complained of a deep-seated pain in the wound; there was suppuration, and pus escaped from its lower-most angle. The lower sutures were removed. There was no disturbance of the general health.

On the eighth day the upper three fourths of the wound were healed; from the lower end pus still escaped, and she complained of the deep-seated pain. But her appetite was good, and there was no constitutional derangement.

On the eleventh day she complained even more than before of the deep-seated pain in the forehead which prevented her sleeping through the night. The severity of the pain was paroxysmal, and even at intervals she felt no pain at all. The appetite continued good. To this date water dressing and warm fomentations over the forehead were applied.

From the fifteenth day after the operation to the conclusion of the case, the details are given from notes carefully taken by Mr. J. Lacy Morley. The patient's appetite became indifferent at this time, and she stated that she had not felt so well as usual the last day or two. The frontal pain had, however, been less, and she slept well. There was a little blood in the pus at that time, and the eyelids and root of the nose were swollen and red. After the lapse of two days this subsided, and she could raise the left upper eyelid. At this date, however, she stated that vision with the left eye was imperfect, objects appearing dim.

Thinking that confinement to bed was tending to depress her, I allowed her to go about the ward.

On the twentieth day, having been out of bed three days, she felt stronger, although she complained of throbbing in the head. The upper end of the left eyelid was more inflamed, and the pus no longer escaped from the lower part of the wound, but from its upper end.

In the afternoon of the twenty-third day the forehead became much more painful, and the cheeks were unusually flushed; and during the rest of that day she was chilly and felt ill. An aperient was taken.

Early in the morning of the next day she vomited, and general feverish symptoms were marked, but there were no new appearances of local inflammation externally.

On the twenty-fourth day, about ten p.m., the nurse, "on wishing her good night," found her insensible and frothy sputa flowing from the mouth. For two hours she continued so, whilst the whole left side of the body and extremities were convulsed, the head and eyeballs drawn to the left side. In the night a fæcal evacuation occurred involuntarily. The next day she remembered nothing of the night's occurrence, but appeared sensible. She complained of great pain in the head, and from the wound there was slight purulent discharge. Bowels not open. Pulse compressible, 120 beats per minute.

To take Mist. Salin. every three hours, and light diet.

On the twenty-sixth day she seemed better in every respect. She had slept last night comfortably, there was less pain in the head, and the pulse was 110. There was a free escape of pus from the wound, but both eyelids were rather more swollen.

On the twenty-seventh day she was delirious and greatly excited from about four p.m. to eight p.m.; she complained of severe pain in the head, and her countenance showed an unusual expression of distress, which was quite unchanged by talking to her. Pulse 96.

The next day her state was unchanged, being even more excited, raving, uncontrollable and constantly calling out with complaints of her head. The bowels not having acted, one minim of croton oil was given. Blistering fluid was used at the nape of the neck.

It was necessary to remove her from the ward to a still room

on the thirtieth day, for it became impossible to compose her by reasoning with her. The cheeks were flushed, eyes suffused, and the pulse 100 and irregular. The bowels did not act, but she vomited during the night and this morning. Morphia was injected under the skin.

Next day she was still excited, although she slept well during last night. Appeared pale and thinner. Pulse 98, and with less power.

On the thirty-second day she seemed less talkative and was more reasonable. She slept some hours last night. Pulse 80, weak; skin cool. Wound discharging freely thick pus.

The thirty-fourth day she seemed considerably improved, the appetite was better, the bowels open, the pulse 98, and she slept several hours last night.

The next day, being more reasonable and requesting imploringly to return to Martha Ward, she was carried there. In two hours, however, she became so excited and noisy that it was necessary to replace her in the quiet room.

On the thirty-fifth day she vomited about two or three ounces of fluid mingled with a little blood. Pulse 100. She took her food with appetite, and slept calmly. There had been blood mixed with the pus escaping from the wound, which last was not particularly painful.

On the thirty-eighth day, in the morning, she seemed heavy and drowsy, after having made more complaints the day before of the severe pain in her head. She also refused food. Pulse 84, regular, but weak. At 7.30 p.m. the nurse observed that she was unconscious, the eyes being fixed, saliva flowing from the corners of the mouth, and, when seen by the house surgeon, the pulse was slow, regular, and weak. In this unconscious state she continued until death occurred, at 11.30 p.m.

Dr. John de Liefde, the house surgeon, was good enough to make a post-mortem examination the next day. From his notes I shall describe the morbid appearances found within the skull, reserving the anatomy of the osseous growth until the last.

The external appearances of the body generally were those of fair average health.

On elevating the calvaria after the usual method there were no morbid signs visible; but on proceeding to remove the cerebrum much difficulty was encountered, in consequence of

the adhesion of both the frontal or anterior lobes to the orbital plates of the os frontis. On attempting to remove the brain, part of the right anterior lobe was torn, and remained attached to the dura mater over the roof of the orbit. At least two ounces of pus escaped when the brain was torn.

The brain being removed, a hard tumour was seen growing from the frontal bone, and extending transversely and antero-posteriorly into the middle of the anterior fossæ of the cranium, hiding the crista galli. To this growth the dura mater was united very firmly, and on the right side the brain also.

The examination of the brain showed that its ventricles were normal. In the anterior lobe of the *left* hemisphere there was an abscess, the walls of which were formed by a thick layer of lymph, apparently indicating that it was of old standing. There were firm fibrinous adhesions between the left lobe and dura mater.

On the *right* side the walls of the abscess in the anterior lobe of the right hemisphere were in part adherent to the dura mater; in other parts they were not so well defined, but consisted of sloughing brain structure. This abscess, in no way connected with that before described, was evidently the most recently formed. Neither of the abscesses implicated the third frontal convolutions.

The thoracic viscera were quite normal.

That part of the cranium from which the tumour was growing, together with the whole of the growth itself, was cleverly excised by Dr. De Liefde and Mr. F. Taylor, M.B. An internal view of it is represented on Plate III, fig. 1; and on Plate II all within the dotted line shows its external relations.

This section we now proceed to describe.

Outside view, Plate II. The piece of the cranium excised after death was the central part of the frontal bone, a small portion of the nasal bones, and what remained of the ethmoid.

Taking a front view there was seen, on the *right*, a part of the glabella and a small piece of the right superciliary ridge; on the left, remains of the corresponding ridge, pushed downwards, with a piece of glass beneath it (*f*), with the supra-orbitar foramen (*e*). Also the superior fourth or root of the nasal bones and the suture connecting them with the frontal bone on the left side.

On the left of the middle line of the frontal bone there was an excavation of the outer table at the site of the left frontal sinus, which extended outwards and encroached upon the dimensions of the anterior opening and cavity of the left orbit. The corresponding part of the bone on the right side was little changed, only some abnormal fissures being visible in the border of the orbit at its inner angle. The left orbital plate of the ethmoid bone was destroyed. The posterior wall of the excavation was formed by the spongy tissue of the bony growth, and in the recent state was covered with mucous membrane. Its margins or borders were formed of displaced normal bone, and a little newly formed bone in places. The internal angular process of the right superciliary ridge was partially absorbed, the right orbital plate of the ethmoid bone entirely gone, and so the right frontal sinus was laid open, and a piece of the bony growth exposed to view in the right orbit (*c*).

Inside view, Plate III, fig. 1.

. The observer holding the dried preparation directly in front of him, as represented by the lithograph, sees in relief in the middle line of the os frontis the faint ridges bounding the sulcus, which, descending towards the foramen cæcum at the base of the skull, terminates at the root of the crista galli of the ethmoid bone. This process is still to be seen on the preparation and quite healthy. On the right side is a small piece of the orbital plate, and on the left the remains of the corresponding plate are elevated by the bony growth. The destruction of parts of this plate allows the growth to be seen projecting into the cavity of the cranium, and extending across the cribriform plate of the ethmoid bone. Openings may be seen between the tables of the cut edge of the bone on its right border, which lead into the right frontal sinus. From the posterior wall of this cavity small bony projections are growing which appear like the early sprouts of a growth of which the large one shows an advanced degree.

. The bony growth itself, which we may now describe, is composed of three marked divisions, viz,: 1, an orbitar (*a*); 2, a cranial (*b*); 3, a nasal (*c*). These parts are seen on Plate III, fig. 1.

1. The principal or largest mass is orbital and cranial ; that

is to say, the growth into the cranium is simply an extension from the orbital division as seen on the plate. A well-defined sulcus runs between the orbital-cranial divisions and the nasal one.

2. The nasal division, about one fourth of the whole growth, consists of a larger left portion and smaller right. Both have destroyed the lateral parts of the ethmoid bone, but between them may be seen the central or vertical plate of that bone. A process from the main growth appears to have pushed through the inner wall of the right frontal sinus into the right nasal cavity.

All the surfaces of the bony growth are irregular, particularly so the surface of the cranial division. The texture of the outside in some parts would lead to the inference that the entire mass of bone was hard. That this was not the case, however, is seen on the section.

The preparation was sawn through in a nearly vertical line, about half an inch to the left side of the frontal sulcus. A profile view of the left division is delineated on Plate III, fig. 2. The cut surface of the normal frontal bone is seen above at *a*, extending backwards to form the roof of the orbit which thin layer of bone has been raised by the pressure of the new growth. The letter *b* indicates the cranial portion of the growth; *c*, the nasal. All the divisions are intimately blended on the surface of the section, and extending as it were into its centre is seen the root of the growth which is continuous with the normal frontal bone, which is dense and compact in structure.

The new growth itself is composed entirely of the finest and most delicate cancellous bone-tissue. So fragile was the texture when dry that it crumbled under the pressure of the saw, and caused that appearance, now seen on the dry preparation, as if there had been a hollow in the centre of the growth. Here and there, as above and below in the figure, along the border of the cranial surface of the growth small patches of compact bone-tissue are noticeable. The starting-point of the growth appears to have been the cancellous tissue between the layers of the bone forming the posterior wall of the left frontal sinus, or the whole of that lamina of bone. Readers examining the preparation hereafter must make allowances for the loss of much of the cancellous tissue in the interior of the growth ; but the

appearance of the section when first made is faithfully represented in the plate accompanying this description.

Remarks.—This case offers many points of surgical interest. We know that outgrowths from the long bones, such as exostoses of the nature above described, most frequently commence at a youthful age. Great difficulty was found in really ascertaining the cause which led to the first observation of the growth. At first sight it might not seem to be of importance to know how its existence was observed. But the two circumstances likely to attract attention to it were produced by different causes. The eyeball was displaced by the pressure of the exostosis itself, whilst the frontal swelling was due to pressure caused by an accumulation of mucus within the frontal sinus. As an aid therefore to diagnosis, it was desirable to know accurately the cause which first led to the observation of any departure from the normal state of the region or neighbouring organs. The statement of the girl herself is most probably the correct one. Her friends were anxious to assign the effects of the fever as the origin of the disease, and concluded that the frontal swelling was dependent upon an abscess, especially as it was first observed during convalescence from such an illness. It is, however, quite certain that at the period when she was ill with fever, two years before admission, no notice had been taken of the frontal tumour. On account of the slow progress the growth pursued after the first observation of its effects it is reasonable to conclude that its commencement was prior to the attack of fever, and certainly that that illness had no connection with its development. We may, I think, consider the osseous growth to be about three years old.

The objective local effects produced by the growth were then the frontal tumour and the dislocation of the eyeball. The frontal swelling being lanced by Mr. Muriel, "thick gelatinous fluid escaped." The fluid which subsequently exuded on the day of her admission into Guy's was of a similar kind, and represented that tenacious mucus which escapes, after long confinement, from cavities lined with mucous membranes. Surely, then, for some time the passage between the frontal sinus and the nasal chamber had been obstructed, the mucus collected in the sinus, its bony anterior wall had been absorbed, and the contents made their escape through the integuments. This forma-

tion, then, of the frontal tumour could be indisputably traced back nearly two years.

Now the diagnosis of it was not involved in difficulty. Clearly it was due to some disease of the frontal sinus. But in tracing the cause of that disease great difficulties were encountered. The hard orbital tumour induced the supposition that some bony growth existed in that region, but the further examination of the case led to no result.

The first serious general effect caused by the disease occurred four months before admission under my observation, when Mr. Muriel found her "insensible." The symptoms described by that gentleman can only be ascribed to some cerebral or meningeal irritation, and it becomes of interest to inquire whether that attack could be produced by the formation of an abscess in the left hemisphere, about the time when the patient was first seen by him. If that cause for the attack be admitted, the girl perfectly recovered from its primary effects, as, when admitted into Guy's, she seemed in very good health. The duration of the abscess, or all that remained of it, must have been about six months, at the time of death.

The frontal swelling being clearly due to some affection of the frontal sinus, the discovery of a hard mass in the left orbit led to the conclusion that there was a bony growth of some kind associated with the frontal bone. Hence the inference that either the cavity itself was filled with a mass of bone, or that the duct leading from it to the nose was obstructed by the same body. I hoped to have found one of those rare, hard, ivory bone-growths in the sinuses, such an one as the specimen in the College of Surgeon's Museum.[1] By indulging in that hope I was of course much disappointed by the result of the operation I performed, as the sequel shows. But in the main features of the case the first diagnosis was correct.

During the time the girl was in the hospital preceding the operation there were no signs of brain disease. All the complaints she made might be attributed to the increase of the growth causing pain.

[1] Coll. Mus., prep. 795. An engraving of this remarkable specimen may be examined in Baillie's 'Morbid Anat. Fasc.,' x, pl. i, fig. 2. There are some interesting observations on such growths by Home, in 'Philos. Trans.,' 1799, vol. lxxxix, p. 239.

The operation I performed was of the slightest kind. Very slight bleeding occurred, and no ill results ensued. After the effects of the operation had subsided she was allowed to leave the bed on the eleventh day; on the twentieth she was not so well; and three days afterwards, on the twenty-third day, the commencement of the fatal disease which caused her death was clearly marked. From that date all the symptoms indicated acute disease of the brain. Whether the operation that was performed excited the development of active inflammation in the right anterior lobe of the brain it is difficult to say. But after death there did not appear that there was any direct connection between the bony growth and the abscess.

In a search after examples of a similar disease I have met with some of great interest, and I proposed to introduce brief extracts of them. But the reader will see an excellent recital of them in the admirable work of Professor Virchow.[1]

A case to which I would especially call attention is published by Professor Textor, of Würzburg.[2] The tumour began to grow at the margin of the right orbit of a woman about twenty-two years old, and in the period of eleven years formed a growth the size of an infant's head in the right frontal and orbital regions. The skin ulcerated in several places, through which openings the bone was visible. Great difficulties were encountered on attempting to remove the growth, which was as hard as ivory. By perseverance, however, it was at last accomplished, and a hole was left as big as a fist, produced by the amalgamation of the cavities of the orbit, upper jaw, and nose. The woman perfectly recovered. This case, in respect of the tissue of the growth, resembles those of Mr. Hilton and M. Michon, quoted in 'Guy's Hospital Reports,' 1868, p. 490.

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[1] 'Die krankhaften Geschwülste,' 2te Band, 17te Vorlesung, Osteome; s. 30, nach 51. Also, 'St. George's Hospital Reports,' by Mr. Hewett.

[2] "Ueber d. Abtragung eines grossen kuglichen Knochenauswuchses des Augenhöhlentheils des rechten Stirnbeins." Mit iv tafeln.—'Würzburger Med. Zeitschrift,' 1865, s. 319.

DESCRIPTION OF THE PLATES,

Illustrating Mr. Birkett's Paper on a Case of Exostosis of the Frontal Bone growing into the Cranium,

The coloured drawings, of which these lithographs are copies, may be seen in the collection at the museum of Guy's Hospital, together with the preparation of the new growth. Drawings $2^{85,\ 86,\ 87}$; Prep. 1073^{10}.

PLATE I

Represents the appearance of the patient soon after admission into Guy's Hospital. In the fold or line of shadow, at the inner angle of the left upper eyelid, is the cicatrix resulting from the healing of the ulcerated opening, formed at the time of admission, as described in the text.

PLATE II

Represents a front and outside view of the frontal and orbital regions of the skull. As stated in the text, only the diseased bones were excised, but the artist has drawn the preparation as if in its natural relations with the surrounding bones, all within the dotted lines representing the appearances presented by the excised portion of the skull.

The excavation in the frontal bone, bounded by the irregular, raised, and slightly everted bony rim, is due to the absorption of the anterior wall of the left frontal sinus. The floor of this hollow, really the posterior wall of the sinus, is rough and irregular, and was formed by the bony growth. The hole now seen in the preparation was made by rough usage in sawing and handling.

a. Outside of cranial growth.

b. Orbital growth, left.

c. Orbital growth, right.

d. Nasal growth.

e. Supra-orbital foramen, from which I took out the nerve.

f. A piece of glass beneath the displaced orbital margin.

Plate 1

Plate I.

PLATE III.

Fig. 1 represents a view of the internal or cerebral surface of the portion of the frontal bone excised, together with osseous growth.

In the cut edge of the right margin the two dark spots show the openings into the right frontal sinuses.

In the centre are the elevations on either side of the frontal sulcus.

On the left the remains of the orbitar process are seen bored through by the new growth, at *f, f.*

The new growth, with its irregular knobby surface, is seen stretching from the left side to the right, across the cribriform plate of the ethmoid bone.

Divisions of the growth are marked thus :

a. Orbitar portion.

b. Cranial portion.

c. Left nasal portion.

d. Right nasal portion.

The central plate of the ethmoid bone is indicated by the letter *e.*

Fig. 2 shows the appearance of a profile view of a vertical section of the frontal bone and bony growth, made about half an inch to the left side of the centre of the above (Fig. 1).

a. The normal vertical process of the frontal bone, drawn too thick, shows a little diploe between the tables above, and spreads out below where the texture is dense and hard.

The remainder is a section of the bony growth extending to the left, *b*, which letter indicates the orbitar-cranial division; *c*, below, the nasal.

The process of bone projecting downwards on the right is a piece of the rim of the excavated anterior surface of the frontal bone; the hollow above is a part of the excavation. The surface of the section, here correctly represented flat, as when first cut, does not correspond with the present state of the preparation, which has been injured by repeated examination and consequent loss of much cancellous tissue.

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A CASE OF

IMMOBILITY AND DEFORMITY OF THE LOWER JAW,

RESULTING FROM SLOUGHING OF THE CHEEK AFTER FEVER; REMEDIED BY OPERATION.

By ARTHUR E. DURHAM.

CASES occasionally occur in which more or less extensive sloughing or phagedena of the cheek takes place either as the result of noma or as a sequel of fever. In such cases the countenance is often very seriously disfigured, and it not infrequently happens that the movements of the lower jaw gradually become more and more impaired in consequence of the adhesions formed and the progressive contraction of the cicatricial tissues. Under these circumstances and conditions the aid of the surgeon is sought. In some instances little or no improvement is effected by the operative measures adopted. In others very beneficial results are obtained. Judging from my own experience and observation, and the critical consideration of published records, I cannot but think that in the majority of cases of the kind under discussion, if not in all, great good may be effected if only the surgeon is bold enough in his operations, and persevering enough in his after treatment.

The elasticity of the skin and other *natural* tissues of the face, and their consequent extensibility when freed from their attachments, together with their great vascularity and the ready power of repair therewith associated, cannot be too constantly borne in mind by the surgeon when called upon to per-

form any operation in this region. Newly formed cicatricial tissues differ from the natural structures in many respects. They are comparatively wanting in substance, elasticity, vascularity, and power of reparative action. If the surgeon confines his operation to such structures, or especially trusts to them, failure is almost certain to result.

The following case seems to me to afford a fair illustration of the good that may be effected by perseverance in carrying out a method of treatment which may justly, I think, be regarded as more simple in execution, as well as safer and more successful in result, than some of the methods that have been from time to time recommended and practised in similar cases. It is not improbable that more good might have been effected if more had been attempted. And there can be no doubt but that further improvement might still be effected if further measures were adopted. But the patient is so well satisfied with his present condition that he is not disposed to submit to another operation.

CASE.—Alfred O——, æt. 37, an able bodied man, of sound constitution, temperate habits, and general good health, was admitted into Job Ward under my care on the 20th November, 1867.

When about nine years of age the patient suffered from a severe attack of fever, of what kind he could not tell, but he was delirious for some time. As a sequel of the fever the left half of the lower lip, some portion of the upper lip, and the immediately adjoining part of the cheek on the left side of the face, sloughed away, and the alveolar portion of the lower jaw became exposed. Two years later a portion of the left upper maxilla with some of the teeth came away. The very serious deformity which resulted after a time became worse in consequence of the growth of the second set of teeth in the lower jaw. The natural mobility of the jaw was impaired from the first; but he was able to some extent to masticate his food, though with increasing difficulty, until three or four months before his admission to the hospital. At that period it would appear from his own account that the lower lip near the left angle of the mouth became adherent to the upper jaw-bone, and the parts gradually contracted so firmly that he was rendered

altogether unable to move his jaw, and the introduction and mastication of solid food became impossible.

His general health continued good, but his strength soon began to fail in consequence of the diminution in the supply of food he was able to take.

Some idea as to the general appearance presented by the countenance of the patient at the period of his admission to the hospital may be gathered from Fig. 1 in the Plate, which is copied from a photograph. On examination it was found that the outer margin of the remaining portion of the lower lip and the adjoining parts of the cheek were firmly adherent to the upper jaw-bone. The lower canine, bicuspid, and first molar teeth, with their fangs, were exposed to view, occupying and projecting through the gap in the lower lip. The vestige of gum below them was continuous with the cicatricial tissue and skin covering the body of the lower jaw. Two teeth closely wedged together, one external to the other, occupied the situation of the canine tooth. Between the remaining portion of the left upper lip and the upper maxilla was a large opening communicating with the nasal cavities. The edges of the teeth of the upper and lower jaws were closely approximated. The patient himself was altogether unable to move the lower jaw. On forcible manipulation, however, it could be moved to a slight degree from side to side, but it could not be moved downwards so as to separate the teeth to any appreciable extent. Saliva constantly flowed through the gap, and portions of any liquid attempted to be swallowed from time to time escaped.

On the 3rd of December, chloroform having been administered, I detached the remaining portions of the lower lip and the upper lip on the left side, and the cheek beyond the left angle of the mouth, from their abnormal connections with the jaw-bones, by free incisions through the cicatricial tissues. Next, by means of saw and cutting forceps, I removed a broad U-shaped portion of the lower jaw, including the five teeth which projected into the gap, but left the lower border of the bone intact. The portion removed with the teeth is represented in the woodcut on the next page.

A thin but strong elevator was then introduced and used as a lever between the teeth of the upper and lower jaws, and they were thus separated to a sufficient extent to permit the introduction of the double screw-wedge of Scultetus, by the action of

which, aided by the division of strong contracted cicatricial bands by the knife, the jaws were still further separated—so widely, indeed, as to show an interval of nearly an inch between the incisor teeth. The lower jaw was then forcibly manipulated, and worked about in various directions. The edges of the gap were then pared, *all portions of cicatricial tissue being removed;* and the upper lip was still further detached from its adhesion to the margins of the opening through the superior maxilla into the nose. Lastly, the denuded edges were brought together and fixed in apposition by harelip pins and sutures. Near the border of the lip, and below, towards the lower border of the lower jaw, the parts came together very well, but in the middle they were subject to considerable tension. Strips of oiled lint were laid in between the cheek and lips and the maxillæ; and a thick wedge of cork was fixed between the teeth. This was subsequently replaced by an appropriately shaped piece of hard wood, which was introduced and kept between the teeth for several hours during each day. In the course of the operation there was some hæmorrhage from the facial artery, which was necessarily divided but readily secured. There was also troublesome hæmorrhage from the inferior dental artery, but this was arrested by the application of ice and the pressure of a fine plug of lint forced into the opening in the bone by a steel probe.

For the first three or four days after the operation the patient went on very comfortably. There was some slight swelling of the face, and some aching of the jaw. He took liquid nourishment freely and easily.

The pins and sutures were removed on the fifth day after the operation. Good union had taken place above and below, but

in the middle the edges separated on the removal of the pins and ligatures by means of which they had held together, and left an almost circular aperture about as large in circumference as a threepenny piece. Strips of sticking-plaster were applied so as to afford support to the parts already united, and to draw together those which remained still separated, and the patient was directed to stretch his mouth open as widely as possible several times in the day by means of a strong slip of ivory used lever-wise.

Ten days after the operation the patient suffered severely from an attack of acute tonsillitis, which very much depressed him, and rendered him indisposed or unable to exert himself to maintain the mobility of his jaw by exercise so constantly and to such an extent as he might otherwise have done.

On the 20th December the abscess that had formed in the tonsil burst. Immediate relief and speedy improvement in the general symptoms ensued.

On the 26th December, twenty-three days after the operation, the patient left the hospital, at his own urgent desire, "to get up his strength" in the country. The greater part of the wound had healed firmly, but a small opening remained through which the saliva flowed.

Two months later (26th February, 1868) the patient returned to the hospital, and was readmitted under my care. Scarcely any visible change had taken place in the external appearances of the parts. The fistulous opening still remained nearly, if not quite, as large as when he went out. But the internal adhesions formed had so far contracted as to prevent him from moving his lower jaw in a downward direction to a satisfactory extent. He had neglected forcibly opening and moving his jaw from time to time in accordance with the directions given him, because, as he said, "he had broken two of his front teeth, and did not care to break any more." He could still, however, move his jaw from side to side, and between the molars of the right side he was able, though very slowly and laboriously, to masticate small portions of solid food introduced through the gap left by his broken teeth. The lips and cheek were puckered in about the left angle of the mouth, and internally were found to be firmly adherent to the upper and lower maxillæ. The border of the lower lip was continuous throughout its whole length, and free as far as

the angle of the mouth. But about three quarters of an inch below its border the lower lip presented the fistulous opening already mentioned, and the margins of this were firmly adherent to the edges of the gap in the lower jaw left by the removal of the portion of bone and teeth at the first operation. The gap in the bone was partially but not entirely filled up by dense cicatricial tissue. The saliva constantly escaped through the fistula.

On the 3rd of March, chloroform having been administered, I separated the parts about the angle of the mouth from their connections with the bone, cutting as far as possible, and, indeed, almost entirely into natural structures, and leaving the cicatricial tissues attached to the bones. In like manner I cut through the natural structures of the lower lip all round the fistulous opening, leaving the cicatricial tissue untouched, and then by incision through the mucous membrane freed the lip itself to such an extent that the margins of the opening through it, both of skin and mucous membrane, could be brought together. The cicatricial bands between the upper and lower jaws were cut across, and the anterior border of the masseter was detached to some extent from its attachment to the bone, the knife being passed close to the bone and parallel to its surface. By means of the screw-wedge of Scultetus the jaws were then separated without difficulty to such an extent as to leave an interval of upwards of an inch between the front teeth, and the lower jaw was freely manipulated and moved from side to side.

Lastly, the margins of the opening through the lower lip were brought together by sutures, and long strips of oiled lint were introduced between the inner surface of the cheek and lips and the parts from which they had been separated.

The day after the operation the patient complained of a good deal of pain. This, however, gradually subsided, and he showed himself during the succeeding days most patient and persevering in submitting to and carrying out the after-treatment. Fresh strips of oiled lint were introduced two or three times daily between the raw surfaces, and the jaw was regularly moved in all directions to the greatest practicable extent. Good union took place between the edges of the opening through the lower lip except just in the middle, and there the small space which remained was soon filled up by granulation.

In the course of three weeks the patient went home, promising to carry out the directions given him and to return for examination from time to time. He appears to have fulfilled his promise very fairly. He regularly stretched his jaw open by means of a strong strip of bone (a tooth-brush handle), and exercised it as far as possible. He also endeavoured to keep a piece of lint between the cheek and lips and the jaws. This treatment he continued steadily during a lengthened period, gradually relaxing his efforts.

In September, 1869, that is, about eighteen months after the second operation, he returned for examination. He was in excellent condition. He could open his mouth to such an extent as to leave an interval of from three quarters of an inch to an inch between his front teeth, and on the right side of his mouth he was able to masticate solid food thoroughly and well, though somewhat slowly. The fistulous opening through the lower lip had entirely closed, so that no saliva escaped. At the lower part, however, there was some adhesion between the lip and the cicatricial tissue which filled up the gap in the lower jaw. The patient had grown his beard, and by this all existing external indications of what had been done were concealed. As he himself said, "no one would have thought he had ever had anything wrong about him." He consented to be shaved for the purpose of having his photograph taken, and his face then presented the appearance shown in Fig. 2 of the Plate. It was proposed to him to submit to another operation in order to have matters still further improved, but he was so well satisfied with his appearance and with the degree of power of mastication which he enjoyed that he declined to have anything further done, and there could be no excuse for urging any further proceedings upon him.

I have heard of the patient quite recently. He has no occasion to regret having been satisfied with his condition a year ago. He can masticate, if anything, better than he could then, and, having again grown his beard, such marks as there may be of the operations are altogether concealed from view.

Remarks.—There can be no doubt but that this case must be considered to have been a very favorable one for operation, in spite of the hideous disfigurement of countenance presented, and the firm contraction and density of the existing cicatricial

tissues.   At the same time, I venture to think it illustrates well
the efficiency and advantages of the method adopted.   The
alternative procedure would have been to have filled up the gap
in the lip and cheek by means of skin transplanted from the
neck or arm, and to have restored mobility to the right side of
the jaw by cutting out a portion of bone on Esmarch's plan,
leaving the left side to remain permanently fixed.   With regard
to the transplantation of skin from some neighbouring part,
there can be no doubt but that in some exceptional cases it may
be necessary to resort to such a proceeding.   But for obvious
reasons it is far better, if possible, to free the immediately sur-
rounding parts to such an extent as to permit them to be brought
together to close the gap.   No one who has not tried the ex-
periment or seen it tried can fully appreciate the ease and
success with which the integuments of the face, when properly
detached from their deep connections, can be stretched and
made to unite across spaces which are so wide as to suggest at
first sight the desirability of borrowing skin from some neigh-
bouring part.   If partial primary union only is obtained, in the
course of time, the opening which remains, as a rule, gradually
contracts, and the band of union grows broader and stronger,
and the way is prepared for a second operation.

Further, it must not be forgotten that if a portion of skin is
borrowed from some neighbouring part, the denuded surface has
to heal, for the most part at any rate, by granulation, and the
resulting cicatrix may add to the previous disfigurement.   And
this is especially unsatisfactory if it should happen, as is not
infrequently the case, that the transplanted skin does not take
kindly to its new position.   Some two years ago a Spanish
gentleman from South America was brought to consult me by
my friend Señor Guillermo de Marthin.   He had suffered
from sloughing of the lower lip and cheek, as the result of an
attack of fever during childhood, for which he had been
profusely salivated.   An ugly gap remained, through which
four teeth in the lower jaw and the adjoining alveolar ridge
were visible, but the teeth did not project into the gap.   The
lip and cheek tissues round the gap were adherent to the bone.
The movements of the jaw were very limited—so limited, indeed,
as to prevent the introduction and mastication of solid food.
Altogether, however, the condition of the patient was by no

means so bad as that of Alfred O—, whose case I have above detailed; and I proposed to attempt to close the gap in a manner similar to that adopted in that case. There appeared no necessity whatever for interfering with the lower jaw itself. The patient, however, had been told in his own country that it would be necessary to transplant some skin to fill up the opening, and, furthermore, had been impressed with the superiority of French surgery. Accordingly, he decided upon going to Paris, and he there placed himself in the hands of a very distinguished surgeon, who performed upon him various operations. At the first, a portion of skin was borrowed from the cheek. At the second, a portion of skin was borrowed from the neck. And at the third, recourse was had to the arm. All the operations failed utterly; and it is needless to add that, after all his sufferings, at the end of nearly a year of treatment the condition of the patient was far worse than it had been at first. No attempt was made to stretch open the jaw. It was intended to divide the bone after the gap in the integuments was properly filled up. Now, although in this case it is, of course, impossible to affirm that the result would have been successful, yet it would have been comparatively easy to have brought together the edges of the gap, if only the lip and cheek had been sufficiently freed from their adhesions. At any rate the patient would have been none the worse, or very little the worse for the attempt if it had failed; and he would have been spared great suffering if even partial success had followed the first operation.

I trust I may not be thought too presuming in thus dwelling on what may seem sufficiently obvious, but I cannot help thinking that, when practicable, it is far better to bring together the margins of such gaps as those under discussion rather than to transplant skin from a neighbouring part—to "fine draw" rather than to "put on a patch;" and, further, it seems to me that the facility and success with which the former operation may be accomplished are not sufficiently appreciated, nor, indeed, generally recognised. As an example, I venture to refer, under all correction, to the case of which two illustrative figures are given in the 'System of Surgery,' by Professor Gross, of Philadelphia. Judging simply from the figures and the description given, it appears to me at once obvious that the gap might have been easily closed without resorting to the expedient of

putting over it a patch of skin dissected up from a neighbouring part, as is represented to have been done.[1]

With regard to the means to be adopted for the restoration of mobility of the lower jaw, it cannot be too constantly borne in mind that in almost all cases the jaw is fixed by adhesions altogether external to the temporo-maxillary articulation. The articulation itself is very rarely indeed the subject of disease, and still more rarely does true anchylosis result even in cases in which the joint structures appear to have been affected. There is, indeed, in our Museum a specimen of true bony anchylosis of the temporo-maxillary articulation, in which there exists perfect continuity of dense bone between the maxilla and the temporal bone, as became clearly manifest on section made by myself some years since.[2]   But this specimen is, I believe, almost if not absolutely unique.   A somewhat similar instance is described by Mr. Howship, and referred to by Mr. Heath in his excellent treatise ' On Injuries and Diseases of the Jaws.' But I am not aware that there are any other instances on record.   In the large majority of cases the immobility of the jaw depends upon degeneration and contraction of the muscles, and the formation and contraction of fibrous bands and adhesions altogether external to the joint.   In some rare instances bone appears to become developed in, or in connection with, the fibrous bands.   The free division of such bands and contracted tissues by the knife or other appropriate instrument to the extent that may seem necessary, supplemented by the stretching or forcible rupture of such as will yield to these means, would seem in the large proportion of cases likely to be attended by a fair amount of success, if only the surgeon is sufficiently persevering, and the patient sufficiently determined in carrying out the necessary after-management.   Our experience in the treatment of stiffness and comparative fixedness of other joints by constant exercise, passive and active, ought to encourage us to persevere in cases in which the free movements of the jaw are impeded.   When the start has once been

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[1] ' System of Surgery,' by Professor Gross.   2nd ed., vol. ii, p. 436, figs. 308, 309.

[2] Specimen, Guy's Hospital Museum, No. 1070.   This specimen was exhibited and fully described by Mr. Hilton, in his Lectures at the Royal College of Surgeons. See ' Lectures on Rest and Pain,' by John Hilton, F.R.S., p. 105.

given by the forcible manipulation of the surgeon, persevering and regular, but comparatively gently, well-directed efforts on the part of the patient are capable of effecting in the course of time very great improvement. The mistake in all such cases appears to me to lie in expecting too much to result at once from a single vigorous procedure on the part of the surgeon. The cases must be very rare in which it can be considered desirable to resort to any such operation as that devised by Esmarch; and, indeed, the results of his operation, and of the various modifications of it that have been suggested, would appear, from the account given by Mr. Heath,[1] to be anything but satisfactory. At the same time it may be freely admitted that in exceptional cases, and as a last resort, the propriety of some such procedure may have fair claims to consideration.

[1] Op. cit., p. 326.

DESCRIPTION OF PLATE

Illustrating Mr. Durham's Case of Immobility and Deformity of the Lower Jaw, resulting from Sloughing after Fever.

Fig. 1.—Represents the appearance of the patient A. O— in November, 1867. From Photograph.

Fig. 2.—Represents his appearance in September, 1869, about eighteen months after the second operation. From Photograph.

N.B.—*By an error on the part of the artist, Fig. 1 has been placed after instead of before Fig. 2.*

Fig 1

Fig 2

STATISTICAL ACCOUNT

OF THE

PATIENTS TREATED IN GUY'S HOSPITAL

DURING 1869.

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By J. C. STEELE, M.D.

THE total number of persons who participated in the benefits of the charity amounted in the course of the year to 80,838, of whom 5164 were resident in the hospital, while the large number of 75,647 were treated as out-patients, and were furnished with the necessary medicaments and appliances. When compared with the returns for any previous year during the last decennium, the number of patients admitted to the hospital during the past year shows a considerable falling off. Compared with the preceding year the decrease amounts to 133, and with the year 1865 (when the annual total of admissions reached a maximum of 5715), to 551. This reduction in numbers is accounted for entirely by the arrangements made in the course of the summer months to provide for the completion of the building known as Hunt's House, consisting in the removal of the block of wards which constituted the eye department, and in the diversion of the small ward previously employed for infectious cases to other necessary purposes. In order to provide for the cases thus displaced a considerable portion of the ordinary surgical accommodation was curtailed; and the falling off in the numbers is consequently more apparent in the surgical than in the medical department of the hospital. The daily number resident, which had maintained an average of 500 for many years past has fallen, in the year under review to 487, being 11 less than the mean

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number resident in 1868, and 22 less than the corresponding number in the year 1861, when it reached the high average of 509.

The mean stay of the patients in the hospital, which was noticed to have risen considerably during the years 1867-68, has maintained an equally high average during the past year, amounting, as is shown in the first table of the series, to 34·42 days—the average residence of the surgical cases exceeding that of the medical cases by one day.

From the diminution in the number of surgical cases (which are well known to present a uniform low rate of mortality), while the number of medical cases has differed but slightly in amount from previous years, there has been a sensible increase in the general death-rate of the year, which has averaged over both compartments combined 10·56 per cent. of the total treated to a termination, the mortality during the year 1868 being at the rate of 9·72. The alterations of internal accommodation alluded to necessitated the temporary employment of more than one-half of the beds in ordinary use for male syphilitic patients for a more severe class of surgical diseases; and from the fact of the former department having never contributed in any appreciable degree to the general mortality, it might naturally have been expected that the death-rate in the surgical wards would have increased in a proportionate ratio; but the actual result is the reverse of this, as the general mortality in these wards has not exceeded 5·81 per cent. of the patients treated to a termination. This circumstance is mainly accounted for by the smaller number of severe accidents received into the hospital in the course of the year, as well as by a considerable decrease in the number of important and critical surgical operations, which usually tend to aggravate the annual mortality; whereas on the medical side the per centage of deaths, which in 1868 averaged 16·40, has increased to 17·34 in 1869. Notwithstanding this high rate of mortality during the past year, it scarcely reaches the average of the two years prior to 1868; but it affords ample evidence of a higher death-rate obtaining among the medical patients than has been usual since the large medical wards were first opened for the reception of the sick.

Besides the deaths which took place in the hospital, 21 persons re brought in dead. Nearly one-half of that number were

persons who had been suffering from fatal organic disease, and who, notwithstanding, had been engaged in their usual employments when attacked with their last paroxysm, while the remainder were chiefly the result of fatal accident in the street. It may be interesting to notice that precisely the same number of persons were brought dead to the hospital during the year 1868, although a larger portion in that year met their deaths from accidental causes. To show the almost hopeless character of the diseases for which many patients are being continually received, it appears from the death-record that among the 496 deaths which occurred during the year, 82 happened within 24 hours of admission, and 195 in the interval during the next six days, so that 277, or nearly 56 per cent. of all the deaths, occurred within a week after the patients had been received into the hospital.

With reference to the columns of results of treatment attached to the disease tables, it may be observed that the column formerly entered with the heading " discharged for special reasons," has been omitted in the accompanying synopsis, as its insertion was both ambiguous and misleading, and the special results were also embraced within the scope of the other columns. The heading included such patients as were discharged for misconduct, usually a very small number; those sent to the small-pox or fever hospitals; a few who discharged themselves before any treatment was adopted, or before their diseases were rightly ascertained; and the remainder, forming, however, by far the larger number of persons associated in the column referred to, were cases of eye disease, who continued their attendance at the hospital as out-patients. The whole number did not amount to more than 2 per cent. of the patients included in the classification.

It has been noticed that the re-arrangement of the wards, consequent on the contemplated structural alterations, had sensibly influenced the number of surgical cases admitted. The diminution referred to affected chiefly the male patients, and especially those admitted with venereal disease, in which department the accommodation was reduced from 27 to 11 beds, an allotment which naturally had the effect of restricting the selection to the graver forms of the malady, and necessitating a longer residence in the hospital. While a reduction of the number

affected with this class of disease has occurred in the male department, it has been noticed that the ward reserved for females, and which gives accommodation for 30 persons, has been continuously occupied during the year, and a considerable number have been refused admission from time to time for want of room. Variations to a greater or less extent constantly happen in connection with other departments; but, from some causes not easily explained, there appears to be an especially large fluctuation in the numbers applying for admission to the lock wards. The number of women received into the ward during 1869 amounted to 268; while the number admitted during 1868 was only 126, and in 1867 it amounted to 226. Next to the more populous neighbourhoods of Southwark and Lambeth, the town of Woolwich was formerly the chief source of supply of patients to this ward; but after the Contagious Diseases Act came into operation in that district the supply sensibly diminished for a time, but it has again increased from other quarters, as has been shown during the past year, to more than its former proportions.

With respect to the antagonistic agencies at work within the hospital, interfering with and greatly retarding the success of treatment, there has been nothing calling for special notice that has not been commented on in previous years. In common with all asylums in which the sick are congregated, and which are open for all classes and to all varieties of disease, the health of the hospital itself may be said to suffer from the causes which are continually in operation within and around it, and which seriously impede its benevolent objects. Those sources of contamination may be conveniently divided into three classes, each having its separate origin, and comprise, first, such varieties of contagious disease as are received into the hospital with the knowledge and sanction of the medical officer; second, cases where the contagious poison is imported into the hospital by friends and visitors to the patients; and lastly, the more formidable class of affections (occurring from time to time chiefly among the surgical patients), which, in the present state of our knowledge, are for the most part attributed to defective hospital atmosphere, or to causes over which we have but limited control. As an illustration of the injurious consequences arising from the introduction of specific poison into the wards, I would specially refer to an

occurrence which took place last February in one of the large medical wards, which for a time threatened serious injury to the patients who were inmates of the ward. Although it is understood generally that the more severe forms of eruptive fever are excluded from the hospital, it occasionally happens that patients suffering from these diseases are admitted in an early stage of the complaint, before the symptoms have sufficiently manifested themselves to warrant refusal, and this accident happened on the occasion referred to. Although the patient, in this instance, was removed within 24 hours of his admission to the small-pox hospital, the contagious virus appeared to adhere to the wards for a fortnight longer, and during the interval attacked four other patients, one of whom died from diabetic and pulmonary disease, while the remainder were transferred without loss of time to the small-pox hospital. It is particularly noticeable, and suggestive of the danger to which the ordinary population of the hospital are always liable, that, notwithstanding every precaution is taken to remove the affected from proximity to the others, and afterwards to disinfect, as far as possible, the ward itself, the persistent and subtle character of the virus develops itself from time to time long after it was supposed that it had been effectively eradicated. An illustration of the self-propagating character of septicæmic disease, or of its virulent tenacity, was afforded by the history of an outbreak of diphtheritic inflammation which occurred towards the close of the year in the large female ward, accommodating 50 medical patients, in the same building as that above referred to; and which was, in the first instance, associated with, and generally attributed to, an aggravated case of malignant uterine disease in the same ward. It was calculated that 14 of the patients in this ward, including a nurse, suffered more or less from inflammatory affections of the throat during the period of four weeks from the first appearance of the epidemic till the temporary vacation of the ward was resolved on, to permit the necessary cleaning and disinfection. As is usually the case each year, several patients (three in number), of whom one died, were attacked with typhus fever in consequence of their proximity to patients who were being treated for this disease. One nurse appears also to have contracted fever, and to have recovered. Two deaths and one recovery are reported to have taken place

from scarlet fever, which, like the other more contagious forms of eruptive fever, is usually excluded from the hospital, but from some unexplained cause these patients obtained admission. Two other cases of the same malady are reported as having occurred within the hospital, in two girls under treatment for surgical complaints, who had no opportunity of contracting any form of contagious disease from their fellow-patients, but where the origin of the infection was distinctly traced to the mother of one of the patients, who had left the bedside of a child suffering from scarlet fever outside to visit her daughter in the hospital. It is very possible that many instances of contagious disease occurring in the hospital may owe their origin to similar causes; as it is but reasonable to expect that the same subtle influences which are continually at work outside should also occasionally manifest themselves among the patients in the hospital.

With regard to the special scourges of the surgical wards— namely, pyæmia and erysipelas—it cannot be said that the numbers attacked show any marked difference from the records of former years, if the proportion of cases predisposing to these complaints is taken into consideration. It will be observed from the column in the operation list distinguishing the fatal complications, that pyæmia or septicæmia has been associated with 7 of the deaths, while it has supervened on injuries without operation 5 times, and entered as a complication with diseases of bones and joints, and on sloughing sores, 11 times; and on 5 occasions it appears to have co-existed, without any traumatic or external cause, with various affections of the internal organs of the body, in which cases there was good reason to suppose that the poison may have been generated, whether spontaneously or otherwise, before the admission of the patients. The fugitive form of erysipelas has been noticed at repeated intervals during the year, chiefly in the surgical wards, and has been generally associated with atmospheric conditions which are favourable to the development of morbific products. Owing to the structural alterations already referred to, it was considered necessary to substitute and separate a portion of one of the wards in the upper floor of the old hospital for the isolated ward formerly used for erysipelatous complaints; and this accommodation, amounting to eight beds, has been continually in requisition

during the year. Many cases of sloughing gangrene and foul sores, besides patients suffering from erysipelatous wounds, have been placed in this division prior to being taken into the general wards; and, on the whole, it appears to have answered the purpose for which it was intended satisfactorily. It would be better, no doubt, to transfer the class of patients referred to, to some isolated building beyond the risk of contaminating others, and to have accommodation there for female as well as for male patients; as it is impossible otherwise to guard effectively against dangers which the atmospheric diffusion might carry into the various departments of the same building in which the foci of contamination exist. Much, indeed, has been done during the year to test the efficacy of disinfecting and other agents, with the view of neutralizing or destroying or preventing the development of organic or other elements, which analogy would lead us to infer exercised some specific influence in the production and subsequent diffusion of these poisons; but the success attending these efforts has been of a very negative character. It is to be hoped that, with the progress made in this important and interesting branch of hygiene, we may yet be able to reduce, if not altogether banish, these plague-spots of infection from our hospital wards, and to render the treatment of injuries and operations more successful and encouraging than they have hitherto been.

The number of accidents under treatment during the year has amounted to 788, or 17 less than in 1868, in which year the accidents were noticed to have diminished to 60 less than were reported in any year subsequent to 1862. The fatal cases during the year under review amounted to 83, or to exactly the same mortality as occurred in 1868, and much below the average of the six years previous to 1868. At no time during the last 10 years have the accident wards been noticed to have been less occupied; and the circumstance is generally accounted for by the suspension of building and public works in the neighbourhood, from which such casualties are usually received.

The decrease in numbers among the in-patients has been noticed to extend, although in a less degree, to the out-patients. Three, if not four, of the classes into which these are subdivided have, however, exhibited a slight increase over the corresponding numbers for previous years. The ordinary medical cases are

seen to number 76 less than in the preceding year, and the ordinary surgical cases to have diminished by nearly 300. Female diseases, after a slight falling-off, are seen again to be on the increase. Diseases of the skin and ear remain nearly stationary, while diseases of the eye continue to increase. The number of women attended during confinement, at their own homes, by the students of the hospital, has amounted during the year to 1929. For some years past the applications for relief from the lying-in charity department have been annually increasing, and the number of confinements recorded during the past year represent, with one exception, the highest number attended in any year since the commencement of the charity. The exception referred to occurred in 1856, when the area of attendance comprised a larger circuit than it does at the present time, and when the number of women relieved amounted to 2011. Among the 1929 mothers delivered during the past year, five deaths only are recorded, and it will be noticed from the table that none of these were attributable to what are usually described as puerperal causes.

Besides the bare numerical analysis of the patients annually relieved at the hospital, which has hitherto formed the ground-work of these reports, there are other subjects intimately associated with the success and well-being of the hospital as a curative establishment which may not be considered unworthy of passing notice in connection with the progress of the institution. One of the most prominent of these, not less from the amount of attention and interest that has been attached to it of late years in this and other kindred establishments, than from its own intrinsic importance and bearing on the general administration, is the system pursued with reference to the nursing of the sick. In the attempts which have been made, and are still being made, for the improvement of nursing, one common object is kept in view by those interested in the success of the experiment, namely, the selection of a class of women of good character, and fitted for the work, whether they have or have not had previous experience, and the discovery of the best means to retain them in the service. To test their fitness, and to render them familiar with the duties they are likely to be called on to perform, it is of first importance that each candidate for the office should undergo a

longer or shorter period of probation, in proportion to her capacities; and to insure their aid and sympathy, as well as to afford them a just equivalent for their services, it is equally necessary that their position should be made as comfortable as is consistent with the arduous character of the task they have undertaken, that they should be well paid, that their work should be properly defined, and that no more should be exacted from them than we could reasonably expect a woman to do with satisfaction to herself and her employers. But in all hospitals, as well as in all associations connected with the nursing of the sick, it has been found impracticable to carry out the work in a satisfactory way without the assistance of other officers to supervise or superintend, and to give manual and effective aid to the nurses while engaged in the performance of their duties. These officers, to whom various designations have been attached, have always been recognized at this hospital by the name of sisters; and to circumscribe the duties of the office, as well as to make the holder personally responsible for a selected charge, it appears to have been at all times the custom for each ward to have the benefit of supervision by a separate sister, who, in addition to the care of the sick, should have the charge of the ward stores, including the linen, medicines, and medical comforts, and also be the medium of communication betwixt the patients and the medical staff. It formerly was the practice to select for this office respectable females who, previous to their appointment, had experience of household work, been upper servants in private families, or been 'engaged in the capacity of nursing the sick out of doors; and not unfrequently the post was filled by one of the ordinary nurses, whose promotion was merited from length of service and presumed suitability. For the more subordinate appointment of nurse, which at the time referred to included not only attendance on the more immediate wants of the sick, but the cleaning and scrubbing of the ward floors and staircases of the hospital, it was necessary to select from a class of inferior grade to the others. Persons offering themselves for the office were, usually speaking, but little removed from the ordinary class of domestic servants; but as the duties imposed were irksome, and even repugnant to the feelings of young and unmarried women, the vast majority of the applicants were widows or women who had

children depending on them, and who were induced to undertake the office in preference to following domestic pursuits, solely from pecuniary considerations. Not that the remuneration was on the average higher than they possibly could obtain in private life, but their wages included also an allowance for board, an arrangement popular with the class referred to, but most unwise in other respects, and continually liable to abuse in a variety of ways. As far as my experience leads me, I believe a similar system existed in all hospitals, and as regarded their individual efficiency they were very much on an equality. The amount of work performed by each nurse, although not more than an active and healthy woman could do, was, from its complex character, both irksome and laborious, and the mode of remuneration was not such as to conduce to their own health and comfort, or to the benefit of the sick. At the time referred to the number of sisters or superiors employed at this hospital was 19, or one less than at present, the single addition having been made with a view to have at all times a probationer ready to fill a vacancy, should such occur. The number of patients assigned to each was the same as now, being governed by the size of the ward, and averaged about 28 in the old hospital and 50 in the new. The number of nurses continually employed was considerably less than it now is, and amounted to 48 only, of whom 26 had day, while 22 performed night work, each respectively having the charge of 18 and 22 patients; or collectively there was one nurse to every 10 patients, on an assumed average of 480. A considerable distinction was made betwixt the office of day and that of night nurse, the latter being considered the more subordinate officer, and the remuneration less, the wages paid to each class respectively being £30 and £26, exclusive of an allowance of beer, supplied from the hospital brewery, and which was considered equivalent to £2. The sisters received the same salary as they are paid at the present time, namely, £50 per annum, with an adequate allowance of beer and milk, which in money value was equivalent to £3. Hence the total cost of nursing the hospital, inclusive of about £40 paid annually for occasional help in critical and important cases, amounted to £2595, or, calculating the average number daily resident at the time at 480, the annual cost of nursing each occupied bed amounted to

£5 8s. 1d. Since the period referred to, and which does not extend further back than the last 12 years, there has been a progressive tendency in this, as well as in most hospitals, to increase the number of nurses in proportion to the patients, as well as to separate the work of nursing from that of the ordinary domestic, and otherwise to improve the social position of the nurse. It has been already stated that the increase does not apply to the number of sisters, which remains much the same; but in addition to the remuneration and allowances referred to, they have also a daily ration of bread, and are furnished with an appropriate costume, which altogether represent a money value equivalent to £58 per annum, while their apartments, for which they had formerly to find furniture, are now for the most part furnished at the hospital expense. The number of women engaged at the present time in the more subordinate work of nursing amounts to 69, of whom nearly but not quite two-thirds are employed in day duty, and the remainder third on night work; so that the former have on the average about 12 patients allotted them, and the latter 17, while collectively there is about one nurse to every 7 patients, assuming that the average number of patients is 500, which has been the case for some years preceding 1869. In order to avoid the abuses so liable to occur from a system of board wages in place of food, the women are now furnished with every article of food which they are likely to require, with the single exception of butter, and a substantial dinner is daily provided for them in an appropriate dining hall apart from the wards, in which they mess in two relays, so that the wards should not be altogether deprived of their services at this important period of the day. Day and night nurses are treated in every respect alike, and each is kept to her special duty, it being considered inconvenient and undesirable to alternate day with night work, as is still the practice at some hospitals. Their pay, with the exception of three of their number, who, while in a state of probation, receive but one-half of the ordinary wage, amounts to £20 per annum, and their board and costume, consisting of three dresses and caps annually, are together equivalent to a further sum of £17 5s.; so that each nurse costs at an average about £37, and the entire nursing establishment may thus be fairly estimated at £3773, or £7 10s. 11d. for each bed in continuous occupation during the year. When con-

trasted with the practice at other hospitals, the system adopted at Guy's will be noticed to occupy a kind of intermediate position with regard both to expenditure, and also to the amount of duty imposed on the female attendants. The table on the opposite page gives a tolerably fair estimate of the manner in which these important arrangements are carried out in the metropolitan general hospitals; but |as a rule each hospital has some difference in minor details of administration which could not be well expressed in the tabular form.

Nearly all have a graduated scale of remuneration, according with length of service and the various grades of nursing; and while it is the custom in some institutions to furnish the women with an ample diet, others give money in lieu of special articles of food, the remainder of the diet being supplied from the hospital stores. The terms " full board," " board," and " partial board," entered in the table, represent three distinctive modes of supplying this desideratum; and the scale of remuneration inserted is calculated on the graduated system adopted after the nurse has been on continuous duty for some years in the respective hospital. The arrangement above referred to for relieving the nurses of a large amount of what is usually called menial labour, has entailed, wherever it has been adopted, a large additional expenditure not represented by the figures in the table. In two of the largest London hospitals, Bartholomew's and the London, the work of scrubbing the floors has lately been .performed by contract, at an annual expense in the former of £600 and in the latter of £360, by charwomen, who attend at convenient intervals, and the authorities of both hospitals are well satisfied with the arrangement. In Guy's, similar work is done by a resident staff of six women, largely supplemented by occasional charwomen in the employment of the matron, and the estimated expense of the arrangement is as near as possible £500 per annum. It cannot be said, however, that the result of this division of labour entirely severs the nursing from the subordinate work of scrubbing, although it has had the effect of reducing the latter duty to not more than four hours per week for each person. It is somewhat difficult to say how a nurse's time could be fully occupied if she were retained only to administer to the sick; and it is equally difficult

ɹraw a hard line of demarcation betwixt the .supplementary

Nursing Arrangements in the following London Hospitals:—

	No. of Beds.	No. of Sisters.	No. of Nurses.	Annual Remuneration of Sisters.	Annual Remuneration of Nurses.	Propor. of Sisters to Patients.	Propor. of Nurses to Patients.	Remarks.
Guy's,	560	20	72	£50. Partial Board and Dresses.	£20. Board and Dresses.	1 to 28	1 to 8	Superannuation Fund for Sisters.
Bartholomew's,	650	25	81	*£58 10s. Dresses only.	£22 15s. Board and Dresses.	1 to 26	1 to 8	{6 Prizes, varying from 31s. 6d. to £5, ann. distrib. among nurses.}
St. Thomas's,	211	7	19	£50. Full Board. Pay for Dresses.	{£25. Board. Pay for own Dresses.}	1 to 30	1 to 11†	
London,	570	15	70	£44 7s. 4d. Partial Board and Dresses.	{£18 16s. Full Board and Dresses.}	1 to 38	1 to 8	{Gratuity of £5 5s. to Sisters annually. Nurses have their dresses washed in Hospital.}
St. George's,	331	19	36	£35. Full Board and Dresses.	£20. Full Board and Dresses.	1 to 17	1 to 9	
Middlesex,	300	9	42	£30. Full Board and Dresses.	£20. Full Board and Dresses.	1 to 33	1 to 7	
St. Mary's,	157	7	18	£30. Full Board and Dresses.	£22. Full Board and Dresses.	1 to 22	1 to 9	
Westminster,	198	6	24	£26 5s. Full Board.	£19 19s. Full Board.	1 to 32	1 to 8	
King's College,	152	7	35	Full Board and Dresses.	{£22. Full Board, Clothing, and Washing.}	1 to 22	1 to 4	{£1845 paid for the entire nursing and cleaning arrangements.}
University College,	160	7	80	Full Board and Dresses.	£16. Do. do.	1 to 21	1 to 5	£1500 Do. do.

* Bartholomew's: after 10 years' service is increased to £66 6s.

† St. Thomas's: proportion of nurses to patients largely supplemented from the Nightingale Training School.

work required in every establishment and the more exclusive duty of nursing. If a perfect separation of the respective duties were practicable, it is generally supposed that a superior class of women would offer themselves for the employment; but it is doubtful whether they would be equally suited for the work. Notwithstanding the circumstance that at Guy's a considerable amount of household work continues to be required of the nurse, the situation is sought after more than ever it was by many respectable females, to whom it offers advantages which are not always to be found in private life; and it not unfrequently happens that applications for office are made by women who have had practical experience of other systems. The truth is, that the so-called menial work is not nearly so irksome nor so laborious, if imposed in moderation, as it is generally represented to be, nor is it half so offensive as many of the important duties connected with the exclusive art of nursing. Much of this work is of a perplexing and trying character, calculated to tax the courage and moral sensibilities of the strongest women. Such duties as the cleansing of foul wounds, attention to the requirements of paralytics, the removal of the egesta, and the laying out of the dead, are all necessarily disagreeable, and to most minds offensive; and there are few women who would not occasionally prefer more subordinate work to the more exalted duties of the nurse under such conditions. On the other hand, a nurse who is anxious for the welfare of her patients will hardly be satisfied to leave the entire cleaning and details of arrangement of her ward to others, who are, to some extent, irresponsible agents, and who are engaged to appear only at stated intervals during the week.

In commenting on what has been done in the metropolitan general hospitals with a view of improving the nursing arrangements, it is impossible to overlook the system which has been carried on with good results for some years in three of the smallest of these establishments. For many years the entire nursing, and to some extent the administrative arrangements of King's College, University College, and, more lately, of Charing Cross hospitals, have been administered by two religious institutions, St. John's House and All Saints' Home, which undertake, through the medium of a sisterhood, to furnish for a specified sum every thing that the hospital may require in the shape of female labour,

and which hold themselves responsible for the work being efficiently done. It is a notable feature of this system, that the sisters or ward superintendents are ladies who give their valuable services gratuitously, and that they are aided by a larger staff of nurses in proportion to the number of patients than are usually employed in other establishments, and that they again are exempted from the greater part of the cleaning and menial work of the wards. The sums paid by the authorities of the respective hospitals, and entered on the table, and which include the nursing, cleaning, and even the cooking done in the hospital, cannot be considered excessive, when we keep in view the number of persons employed; in fact, it is difficult to see how the communities referred to are reimbursed their necessary expenses without other aid. With respect to the manner in which the nursing is conducted in these establishments, it is scarcely necessary to repeat what is known to every one interested in the subject of nursing, that it is highly satisfactory; that the presence of ladies in each department secures a sense of decorum and propriety among the patients and attendants which are not always to be found in other establishments; and that the sick are indulged in many little comforts and pleasures which they would be less likely to receive from attendants selected from their own class in life. The attention paid to the comfort of the sisters and nurses, in providing them with their meals at a common table apart from the wards, and in finding them separate sleeping apartments, with many conveniences which are rather exceptional than the rule in most hospitals, are all calculated to have a beneficial influence. But while freely admitting these and other benefits likely to be associated with the nursing system in question, there are circumstances connected with it which may be open to serious objections even to those who have been most instrumental in carrying it out in its entirety. Without reference to the religious question, which is really a secondary matter in connection with the object of a hospital for the sick, there must necessarily be a duality of government, with all its inconveniences, in administering the internal affairs of a charity, when the larger number of those employed are not officially responsible to the governing body, but are ruled and controlled by a superior agency outside. It appears impossible but that misunderstandings should arise from time to time with reference to many questions of domestic

·economy, involving considerable expenditure of money, which
·under a single system of administration would be at once decided,
and in a way more in keeping with the limited resources of
a voluntary charity than irresponsible agents are likely to follow.
Again, recommendations for alterations, additions, and im-
·provements in ward furnishings, in diet, and in the numerous
requirements of a hospital, must necessarily be received with a
·considerable weight of authority from those who have voluntarily
devoted their time and services to the great work; and it is not
likely that any committee of management would strongly oppose
innovations suggested by individuals to whom at the same time
they would be willing to concede better judgment if not experience.
.It is only by admitting these and similar obstacles to an economical
administration that we can account for the great disparity which
exists in the expenditure of such hospitals as have been nursed
on the new principle compared with those in which the old
system still obtains—a disparity, it will be seen, scarcely warranted
by the results, as far as the patients are collectively concerned.
·From a document drawn up with much precision, and recently
published by the authority of the governing committee of a
London hospital,* it appears that the cost of each bed occupied
continuously in the following hospitals amounted during the year
1868 to the sums appended :—

Univer. College.	Middlesex.	Charing Cross.	King's.	Guy's.	Westminster.
£77 4s. 10d.	£62 6s. 1d.	£59 14s. 9d.	£59 6s. 4d.	£47 18s. 7d.	£39 19s 1d.

The nursing of the Middlesex Hospital, though not connected
with any religious community, has undergone some radical
changes during the last few years, with the effect, it is generally
understood, of benefiting the sick, and certainly of improving
the position and comforts of the nursing staff; but whether the
advantages of the new system in this and the other hospitals
mentioned offer an adequate return for the greatly increased
expenditure is a question which can only be answered by those
.who are thoroughly versant with the working of both systems.
It would certainly require very strong arguments to prove that a
patient in the North London Hospital had double the advantages
of a patient resident in the Westminster Hospital, or that it was

* Hospital Expenditure. By Jos. G. Wilkinson.

a greater charity to maintain 100 beds at the former institution at the same outlay as sufficed to provide for 200 beds at the latter.

But to return to the system of nursing as pursued at Guy's, and which claimed to occupy an intermediate position betwixt the extremes referred to. One of the first considerations of late years has been the selection of a better class of persons to fill the office of sister, or ward superintendent. The duties of this office are of a very multifarious character, and require on the part of the person holding it that she should be thoroughly alive to the numerous responsibilities of ward management. She is expected to be in constant communication with the executive of the hospital, and also to be the medium of communication betwixt the patient and the medical officer. In both capacities she is responsible for the good conduct of her nurses, for the discipline of the patients, and for the administration of diets, medicine, and medical comforts, and to be always ready to afford information respecting individual cases. From the fact of the daily rations, linen, and ward stores generally, being placed under her immediate control, she is responsible to the hospital authorities for their administration and safe custody, and she is required to exert her energies to prevent waste and extravagance in every way. It is clear that such duties as these can be best performed by persons who have had previous opportunities of practical housekeeping, combined with a knowledge of the world, and who have a wholesome confidence in themselves. It is important also that at the time they enter on duty they should neither be too young nor too old, hence the age at which appointments are made ranges from 30 to 40; and it is imperative that candidates for the office should have received what is usually understood by a good education. To respectable females of this class the office holds out many attractions which are not usually found associated with pursuits by which a livelihood is obtained in more private spheres, and to a person possessed of sufficient tact and firmness, combined with a love for the work, the duties are neither laborious nor unpleasant. It has always been the desire of the Treasurer and Governors to render the social position of the sister as comfortable as the exigencies of the hospital will permit. With this view each has been provided with a comfortable sitting-room and separate sleeping apartment, the former opening into and

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overlooking the ward, and of late years these have been furnished at the hospital expense. They are allowed, and are, in fact, enjoined to devote an hour or two daily to out-door exercise when their services can best be spared, and they are each entitled to a three weeks' holiday in the course of the year. As was formerly explained, the board allowed them is of a very partial character, and they are compelled to purchase the chief articles of food and have them cooked in the wards or in their rooms, to be eaten at a convenient opportunity, not always attainable. There can be no doubt that this arrangement is highly objectionable, that it is calculated to interfere greatly with health and comfort, and that it may possibly deter many from seeking the office who would otherwise be eligible candidates. It has been argued that if a common table were provided for the sisterhood it would have the effect of removing them from their wards at a period of the day when their services were in greatest requisition; but this difficulty could be surmounted by fixing the time for dinner at a later hour in the afternoon, after the visit of the medical staff. With the present contract prices for food, a plain though substantial dinner could be provided daily at a moderate outlay, and would not add materially to the general expenditure for nursing purposes, which by itself cannot be called extravagant when compared with other institutions, and which could not fail to be an immense boon to the persons concerned.

In the selection of candidates for the office of sister it was formerly thought desirable occasionally to promote a nurse who, from long experience and good conduct, was thought worthy of the higher appointment; but although there are many strong reasons in recommendation of this practice, the experience of the hospital has certainly not been in favour of repeating the experiment. It has been found in nearly every instance in which a trial has been made, that however apt and efficient the nurse might be in her subordinate capacity, in her new sphere of control and supervision she was often at fault, and was deficient in the requisite authority to support her new position. On this account the Treasurer and committee have for many years selected females of a better class for the office, who have not previously had experience of the work, either in this or in any other hospital, and there appears no difficulty in getting an adequate

number of applicants when vacancies occur. Among these are often to be found widows and daughters of professional men, and others of good social position, while the majority have been previously engaged as housekeepers, governesses, and school teachers, and who are anxious, for diverse reasons, to adopt the new vocation. It can be readily understood, that however highly recommended, and however ambitious the candidates are to undertake the employment, that they are not always suited to the work; and to test their capacity, as well as to familiarize them with their duties, it is imperative that they should pass a period of probation, varying from six to twelve months, before they are finally appointed. While in probation they are specially enjoined to acquaint themselves with the individual requirements of the sick, to observe order, cleanliness, method, and punctuality in the routine of daily occurrences, which must govern every well-regulated establishment, and they are required also to familiarize themselves practically with a nurse's duty, so that they may be able to instruct and direct their assistants in their ward duties. In connection with the office of sister it ought to have been previously noticed that a superannuation fund was established nearly 20 years since, to which they are required to subscribe quarterly payments, varying according to the age at which they enter, and to which the governing body contribute an equal amount. This fund entitles each contributor to a retiring allowance at the age of 65 or earlier, amounting to £30 per annum, and in the event of death, or on their leaving the hospital to follow other pursuits, their contributions are returned with interest to them or their friends.

When fully occupied the hospital affords employment for 72 nurses, of whom nearly two-thirds are engaged in day and the remainder in night work. The number of nurses to patients is shown to be in the proportion of 1 to 7, with the ordinary average of patients, and 1 to 8 if every bed was occupied. On these women devolve the main duty of attending to the immediate wants of the sick, the making and changing of the beds, the washing of such patients as are unable to help themselves, the administration of enemata, the application and making of poultices and fomentations, the dressing of wounds, and attendance on the dressers during their frequent visits. Besides these

duties, which are the exclusive province of the nurse, but which would by no means exhaust their time, they are expected, along with such convalescents as are able to accompany them, to carry the food from the kitchen, to distribute the diets, to make the necessary arrangements before and after meals, to sweep up the ward and fire-places, to clean the small presses (lockers) attached to each·patient's bedside, and to remove all soil and offensive matters at regular intervals. For this work, as was formerly stated, wages amounting to £20 a-year and a substantial board were allowed, and in order to relieve the monotony of the duty, arrangements are made by which each nurse may have a couple of hours to herself daily, a holiday every four weeks, and a week's absence from duty each year. In the selection of persons to the office of nurse preference is given to a good class of domestic servants betwixt the ages of 20 and 40, and married women are usually allotted to male wards, which in general most nurses prefer to the female. After a woman has once fairly taken to the work it rarely happens that she leaves it, unless to better her condition by marriage, or by some other family arrangement; but it does not follow from this circumstance that the majority remain with us permanently. Like others engaged in domestic occupations, they occasionally leave the service from caprice, or desire for change, and migrate to other hospitals, probably to test their comparative merits, and it is not unusual for them to engage in private nursing in connection with institutions for this purpose. It sometimes, though rarely, happens that they are discharged for misconduct. Occasional instances of drunkenness occur, but the more common and more venial faults are incompatibility of temper, staying out without leave, receiving money from patients or their friends, or neglect of some important duty, offences which do not always prove a barrier to their obtaining employment elsewhere.

When entering on duty for the first time, it has been the practice of late years to make the nurse undergo a period of pupilage, during which time she is furnished with the ordinary rations, but is only entitled to one-half of the remuneration allowed to the regular nurse. While learning the duties she is not employed in the ordinary routine ward work, but she is moved about from one part of the hospital to another, wherever it is

thought supplementary assistance is required. This arrangement has worked remarkably well, and would be extended with much advantage, provided there was additional sleeping accommodation, as it does away with the occasional necessity of appointing applicants from other hospitals, and will probably have the effect ultimately of retaining the women longer in the service of the hospital. Among the improvements carried out with the view of promoting the comfort of the nurses, not the least important was the provision made many years ago to supply them with good sleeping accommodation with appropriate furniture and requirements. Bearing in mind the unhealthy character of their employment, it was considered advisable to have their sleeping apartments away from the wards, in a separate building if possible; and that instead of the old form of ward dormitory, separate spaces, or cubicles, as they are called, should be partitioned off so as to allow each nurse to have a private apartment for her exclusive use. In the construction of the building known as Hunt's House · this desideratum was kept in view, and the upper floor, which from structural peculiarities is completely isolated from the wards beneath, was divided into 42 separate sleeping apartments, and appropriately furnished, and a similar arrangement for 30 additional spaces is now being effected in connection with the wing of the building at present in course of completion. In illustration of their liability to contract disease, it may be stated that seldom a year passes without one or more nurses being known to suffer from the effects of contagion, and of occasionally falling victims to their own devotion in behalf of the sick. The diseases to which they are peculiarly prone are typhus fever and erysipelas; and the virulence with which they are usually attacked appears to have originated the common observation of those familiar with hospital life, that nurses and doctors suffer more severely in relative proportion than those whom they may have the fortune to attend. Among the more frequent causes of temporary disablement are poisoned wounds of the fingers, with absorbent inflammation, and the accompanying constitutional disturbance; but as a rule these affections are less traceable to the absorption of animal poison from diseased surfaces, than to petty injuries arising from cleaning and scouring.

The advantages and facilities afforded by the hospital for

practical instruction, and so largely availed of for the purposes of a medical school, renders it also an excellent training institution for nurses; and many societies which have been originated for the supply of nurses to the sick have gladly availed themselves of the opportunities allowed them for instructing their probationers in the art. Among these may be mentioned the Nursing Sisters' Institution, established by the celebrated Mrs. Fry in 1840, which has an active staff of nearly 100 women constantly engaged in attendance on the sick in private houses. This society is nearly if not quite self-supporting, and is based on principles worthy of imitation by the many nursing establishments which have been springing up of late in every part of the country. There are usually two probationers from the institution at work in the hospital, where they remain for a period of two months, apportioning their time betwixt the medical, surgical, and obstetric wards, so that on an average 12 women receive the benefit of the instruction during the year. Another society, known by the name of the British Nursing Association, and which aims at a higher degree of instruction amongst its probationers by a more lengthened period of pupilage, has within the last two years been permitted to send several of its probationers for training to the hospital. But perhaps no nursing community in connection with the hospital is more deserving of sympathy and support than that established some years since by Mrs. Ranyard, with the sole object of district nursing among the London poor, and of providing them with many medical comforts which otherwise it would be impossible for them to obtain. The class of women selected for this work are of a more homely character than the others formerly referred to, and belong to a class whom, with the march of improvement, we are likely to see banished altogether from modern hospitals; for, while they are expected to perform the usual functions of a nurse, they are also required to adjust, clean, and occasionally to scour the floor of the sick chamber, and in fact to combine the office of housemaid with that of nurse, when, as too often happens, there is no one else to do the necessary duty. There are always two or three nurses from Mrs. Ranyard's establishment doing duty in the hospital, where they remain usually for a period of two months before commencing their in   t work. In one important respect this society has

become to be of great advantage to the hospital, as an auxiliary agent in connection with the out-patient department; since the benevolent lady who has originated it, and who still superintends its operations, has afforded facilities to the medical staff by which they have it always in their power to request the attendance of a district nurse on any patient who they might consider would be benefited by her attentions. It would indeed be difficult to over-estimate the importance of this boon in connection with the necessarily unsatisfactory character of the minor arrangements of the department in question.

The opportunities thus utilized for the instruction of nurses demonstrates the practicability of the already comprehensive administration of the hospital being made available to meet a want which can only be reached on a large scale through the agency of a large public hospital, embracing facilities for practical training in medicine, surgery, and midwifery. The organization of such a training establishment in connection with the hospital, besides conferring a great boon on the public, would prove an incalculable gain to the hospital itself, inasmuch as it would enable the executive to select for permanent employment females best adapted for ward work, and insure also a more comprehensive system of pupilage and probation than it is at present able to effect. The structural arrangements of the buildings now in course of completion offer many facilities for carrying out such a work: and from the demand for employment from private sources which might be anticipated if a nursing association was in operation, and which at present must be met by a helpless refusal, there can be little doubt of the ability to conduct it without encroaching in any way on the money resources of the charity.

STATISTICAL TABLES OF DISEASES.

I.—*General Statement of the Number of Patients in the Hospital during 1869.*

Remaining 1st January, 1869, ... 516
Admitted during the year, ... 4648
———
Total, ... 5164

Discharged as well or convalescent, ... 1682
Relieved, ... 2047
Unrelieved, ... 470
Died, ... 496
Remaining 1st January, 1869, ... 469
———5164

MEDICAL WARDS.		SURGICAL WARDS.	
Remaining 1st January, 1869, ..	205	Remaining 1st January, 1869, ..	311
Admitted during the year,	1874	Admitted during the year,	2774
	——		——
Total, ...	2079	Total, ...	3085
Discharged, ...	1584	Discharged, ...	2615
Died, ...	332	Died, ...	164
Remaining 1st January, 1870,	163	Remaining 1st January, 1870,	306
	——2079		——3085

Average number resident, daily, throughout the year, .. 487 { Males, 293 Females, 194

Mean residence of each patient, 34·42 days.

Rate of mortality over all the cases, 10·56 per cent., { Males, 11·2 per cent. Females, 9·5 per cent.

MEDICAL CASES.		SURGICAL CASES.	
Average number in Hospital, 193 { M., 107 F., 86		Average number in Hospital, 294 { M., 186 F., 108	
Mean residence,.. .. .. 33·8 days.		Mean residence, ... 34·7 days.	
Rate of mortality 17·34 per cent., { M., 20 F., 14		Rate of mortality 5·81 per cent., { M., 6·2 F., 5·3	

II.—*General Summary of the Tables of Diseases.*

DISEASES.	Total.	Cured.		Relieved.		Unrelieved.		Died.	
	M. & F.	M.	F.	M.	F.	M.	F.	M.	F.
1. General diseases...................	1008	209	173	186	246	37	37	76	44
2. Diseases of the nervous system...	304	46	33	90	59	28	25	17	6
3. Diseases of the eye, ear, and nose..	302	55	27	94	92	21	13	..	..
4. Diseases of the heart and blood vessels	208	13	12	45	33	25	6	49	25
5. Diseases of the respiratory organs.	200	46	20	55	26	9	3	25	16
6. Diseases of the digestive organs..	404	82	49	90	56	40	27	36	24
7. Diseases of the urinary organs...	419	106	12	184	30	35	9	36	7
8. Diseases of the female organs of generation	299	..	96	..	132	..	42	..	29
9. Diseases of the organs of locomotion	400	46	26	156	87	49	20	11	5
10. Diseases of the cellular tissue...	115	37	12	30	17	7	3	5	4
11. Diseases of the skin............	220	45	38	62	52	7	9	5	2
12. Miscellaneous returns..........	26	6	4	1	10	4	1	..	..
13. Poisons and general injuries.....	77	28	17	10	2	..	..	12	8
14. Local injuries..................	713	374	70	164	38	9	4	48	6
Total...................	4695	1093	589	1167	880	271	199	320	176

III.—*Table of Monthly Admissions, Dismissions, and Deaths, distinguishing the Sexes.*

	MEDICAL PATIENTS.						SURGICAL PATIENTS					
	Admitted.		Discharged.		Died.		Admitted.		Discharged.		Died.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
January...............	77	80	62	64	17	8	153	75	158	70	11	3
February.............	72	77	82	76	15	10	142	60	124	65	11	3
March...............	90	73	49	60	16	14	159	81	150	82	9	6
April...............	75	64	58	48	18	10	130	84	147	66	6	6
May................	77	58	72	56	16	12	146	86	125	71	6	5
June................	97	74	72	60	21	8	145	80	147	82	9	6
July	99	81	83	73	21	8	190	78	171	76	4	3
August..............	84	65	62	58	14	10	132	84	141	71	8	3
September..........	93	81	79	69	19	17	154	83	147	80	7	3
October.............	83	73	65	60	19	12	147	85	130	86	12	2
November..........	96	78	79	60	15	9	140	94	129	90	12	5
December...........	81	46	63	74	16	7	160	86	136	71	18	6
Total..........	1024	850	826	758	207	125	1798	976	1705	910	113	51

TABLES OF DISEASES WITH RESULTS OF TREATMENT.

1.—*General Diseases, including Epidemic, Endemic, Contagious, and Constitutional Distempers.*

	Cured.		Relieved.		Unrelieved.		Died.		Registered Fatal Complications, &c.
	M.	F.	M.	F.	M.	F.	M.	F.	
Small-pox	..	..	..	..	3	..	..	..	{ Sent to small-pox hospital.
Chicken-pox	1	..	..	..	..	..	..	..	
Measles	2	..	..	..	..	..	..	..	
Scarlet fever	..	1	..	..	..	..	1	1	
Typhus fever	5	5	..	..	..	..	2	1	
Enteric fever	10	1S	..	..	..	..	2	6	
Relapsing fever	3	..	..	..	..	..	..	..	
Simple continued	..	1	..	..	..	..	..	..	
Febricula	4	4	..	1	..	..	..	..	
Ague	9	4	..	..	..	1	..	..	
Diphtheria	..	..	..	..	..	..	..	1	
Hooping cough	..	..	..	..	..	..	..	1	
Parotid inflammation	..	3	..	..	..	..	..	..	
Sloughing phagedena	..	..	..	..	..	..	1	..	{ Abdomen and pelvis.
Erysipelas	18	14	4	2	..	..	1	1	{ Bronchitis 1, delirium tremens 1.
Pyæmia, idiopathic	..	..	..	..	..	..	3	..	
Acute rheumatism	50	25	13	15	1	..	..	2	Pericarditis.
Gonorrhœal rheumatism	1	..	2	1	..	..	..	..	
Synovial rheumatism	..	..	1	1	..	..	..	..	
Muscular rheumatism	1	..	1	..	..	..	..	..	
Chronic rheumatism	15	13	14	14	2	2	1	1	{ Pericarditis 1, endocarditis 1.
Gout	4	..	5	1	1	1	1	1	{ Apoplexy 1, atrophied kidneys 1.
Rheumatic gout	1	..	2	1	..	1	..	..	
Syphilis and ven. dis	66	78	79	174	6	16	1	..	Hepatic ascites.
Cancerous growths (parts not specified)	1	..	..	..	5	..	1	1	
Colloid or non-malignant growths—									
Sebaceous	6	3	1	1	..	..	..	..	
Fatty	2	1	..	3	..	..	1	1	{ Gangrene 1, septicæmia 1.
Warty	1	1	..	..	..	..	..	..	
Cystic	2	1	..	..	..	3	..	..	
Fibro-plastic	..	1	..	..	..	2	..	..	
Fibrous	1	..	..	..	..	..	..	..	
Vascular	..	..	..	..	..	..	..	1	Meningitis.
Cartilaginous	..	..	1	..	..	..	..	..	
Glandular	..	..	1	..	..	..	..	..	
Osseous	..	..	..	..	..	..	..	1	Abscess of brain.
Not specified	..	..	..	1	1	..	..	..	
Lupus	..	..	2	1	1	..	..	..	
Scrofula (general)	..	..	3	..	1	..	2	1	{ Convulsions, peritonitis.
Tubercular meningitis	..	..	..	..	..	..	..	1	
Phthisis	..	..	40	18	15	10	55	23	
Rickets	..	..	1	1	..	..	..	..	
Diabetes	..	1	14	1	1	..	3	..	{ Sloughing lung, small-pox, phthisis.
Purpura	1	..	..	1	..	..	..	..	
Anæmia	3	2	..	2	..	..	..	..	
Chlorosis	..	1	..	7	..	1	..	..	
General dropsy	2	1	1	..	..	..	..	..	
General atrophy	..	..	1	..	..	..	1	..	
	209	173	186	246	37	37	76	44	

f]

2.—*Diseases of the Nervous System.*

	Cured.		Relieved.		Unrelieved.		Died.		Registered Fatal Complications, &c.
	M.	F.	M.	F.	M.	F.	M.	F.	
Encephalitis	..	..	..	..	..	..	..	1	
Meningitis................	..	..	..	..	..	..	3	1	
Softening of brain.......	..	..	..	..	..	..	2	..	
Apoplexy.................	..	..	3	..	..	..	4	..	
Sunstroke................	..	..	1	..	..	..	..	..	
Tumour of brain..........	..	..	1	..	..	..	1	..	
Cerebral disease..........	..	..	5	2	6	..	2	..	
Diseased spinal cord....	..	..	..	1	1	..	1	1	{ Cancer of spine 1, peritonitis 1.
Paralysis................	..	1	6	1	1	..	..	1	
Hemiplegia (general),....	5	..	12	6	2	..	..	..	
Hemiplegia (partial),....	1	1	2	1	..	..	..	..	
Paraplegia (general),....	2	..	3	4	2	4	3	..	{ Renal dis. 1, bed-sores 1, broncho-pneumonia 1.
Paraplegia (partial)	1	1	6	3	..	1	..	..	
Locomotor ataxy........	..	..	4	..	1	1	..	..	
Infantile paralysis.......	..	..	1	1	..	2	..	..	
Local paralysis...........	1	..	..	1	2	1	..	..	
Facial paralysis..........	1	..	2	..	1	..	..	..	
Lead paralysis...........	2	..	3	1	..	..	..	..	
Tetanus..................	2	..	..	..	..	..	1	1	
Epilepsy.................	5	1	15	5	1	2	..	..	
Convulsions..............	..	1	1	..	..	..	..	..	
Spasm...................	2	..	1	..	..	..	..	..	
Chorea	5	14	4	11	1	2	..	1	
Hysteria	..	13	1	13	..	9	..	..	
Neuralgia	1	..	..	2	1	2	..	..	
Sciatica	2	..	..	..	..	..	..	..	
Irritable stump..........	2	..	2	..	1	..	..	..	
Pleurodynia	2	..	..	..	..	..	..	..	
Hyperæsthesia	..	..	..	1	..	..	..	..	
Anæsthesia..............	..	..	..	1	..	..	..	..	
Hypochondriasis.........	1	..	3	..	2	..	..	..	
Mania...................	..	..	..	..	2	..	..	..	
Idiotcy	..	..	..	..	1	..	..	..	
Vertigo and headache....	6	..	6	2	..	..	..	..	
Nervous debility........	2	..	1	..	1	..	..	..	
Pains, cause unascertained	3	1	7	3	2	1	..	..	
Total............	46	33	90	59	28	25	17	6	

3.—*Diseases of the Eye, Ear, and Nose.*

	Cured		Relieved		Unrelieved		Under Treatment		Registered Fatal Complications, &c.
	M.	F.	M.	F.	M.	F.	M.	F.	
Ophthalmitis	..	..	1	..	1	1	1	..	
Granular lids	1	..	..	1	1	..	..	..	
Keratitis	1	..	1	5	..	..	..	..	
Ulcer of cornea	..	..	1	2	..	..	..	..	
Opacity of cornea	2	..	8	7	1	1	1	1	
Conical cornea	..	..	..	..	..	..	..	2	
Staphyloma of cornea	1	..	..	..	..	1	..	..	
Corneo-iritis	1	..	3	3	..	1	1	2	
Sloughing cornea	..	..	..	1	..	..	..	..	
Iritis	..	..	2	6	..	1	1	1	
Closed pupil	..	..	6	9	1	1	3	2	
Choroiditis	..	..	..	1	..	..	1	..	
Choroido-iritis	..	1	1	..	..	1	..	..	
Amaurosis	..	..	1	..	2	..	..	..	
Hæmorrhage into retina	..	..	1	..	1	..	1	..	
Anæmia of optic nerve	..	..	2	..	..	1	..	..	
Sclerotitis	..	..	..	1	..	..	..	..	
Cataract	35	17	3	11	4	2	18	9	
Traumatic cataract	1	.	..	..	..	..	1	..	
Pannus	..	..	8	4	..	..	1	..	
Glaucoma	2	..	7	12	4	2	1	1	
Injury to eye	2	..	1	..	2	..	3	..	
Presbyopia	..	..	..	..	..	..	1	..	
Amblyopia	..	..	4	..	3	..	..	..	
Myopia	..	1	..	1	..	..	1	..	
Suppuration of eye ball	..	..	..	1	..	..	1	..	
Shrinking painful eye	4	1	..	..	..	1	..	..	
Lachrymal obstruction	..	1	..	2	..	..	..	..	
Ectropium	..	..	..	1	..	..	..	..	
Trichiasis	1	..	..	..	..	..	..	1	
Strabismus	..	4	..	..	..	..	..	1	
Protrusion of eye ball	..	..	1	1	..	..	..	..	
Diseased orbit	..	..	..	1	..	..	1	..	
Syphilitic changes	..	..	1	1	..	..	1	..	
Symblepharon	..	..	1	..	..	..	..	..	
Diseases of the ear—									
Polypus	1	..	1	..	..	..	..	..	
Abscess in tympanum	1	1	..	..	..	..	..	..	
Disease, various	..	..	1	..	1	..	..	..	
Diseases of the nose—									
Ulceration of membrane	..	..	..	..	..	..	..	1	
Epistaxis	1	..	1	..	..	..	..	..	
Polypus	1	..	..	..	..	..	..	..	
Foreign bodies in nares	..	1	..	..	..	..	..	..	
Total	55	27	56	71	21	13	38	21	

4.—*Diseases of the Circulatory System, Absorbents, and Glands.*

	Cured.		Relieved.		Unrelieved.		Died.		Registered Fatal Complications, &c.
	M.	F.	M.	F.	M.	F.	M.	F.	
Pericarditis.............	..	..	..	..	..	..	1	2	
Cardiac dropsy..........	..	..	2	..	1	..	14	6	Pleurisy 2, peritonitis 1.
Cardiac disease........	1	..	16	16	6	..	16	7	Vesical calculus 1, hydatid 1, pneumonia 1.
Endocarditis............	..	..	..	..	..	..	5	2	Enlarged liver 2, enlarged spleen 1.
Valvular disease........	..	..	4	3	1	1	2	1	
Hypertrophy of heart....	..	..	..	..	..	..	..	2	
Palpitation.............	1	..	1	..	..	..	..	..	
Angina pectoris........	..	..	1	..	..	..	..	..	
Syncope	..	1	..	..	..	..	..	..	
Diseased arteries.......	..	..	..	..	1	..	..	..	
Occlusion, embolism....	..	..	..	..	1	..	1	..	Pulmonary artery.
Aortic disease..........	..	..	8	2	2	..	3	..	
Aortic dilatation........	..	..	2	..	..	..	..	..	
Aortic aneurism........	..	..	3	1	3	..	4	1	Pericarditis 1.
Iliac aneurism..........	1	..	..	..	..	..	1	..	Pneumonia.
Femoral "	..	..	..	..	..	..	1	..	Hæmorrhage.
Popliteal "	1	..	..	..	..	..	..	..	
Post tibial.............	1	..	..	..	..	..	..	..	
Innominate.............	..	..	..	..	1	..	..	..	
Phlebitis	1	2	..	1	..	1	..	..	
Phlegmasia dolens......	..	2	..	1	..	..	..	..	
Varicose veins.........	2	1	1	1	3	..	..	..	
Nævus, vascular.......	..	3	2	..	1	..	..	..	
Hæmorrhage	1	1	..	..	..	..	..	..	
Inflamed lympathics.....	1	1	1	..	..	..	..	..	
Suppuration of glands....	1	1	3	1	..	..	..	..	
Hypertrophy of glands..	..	..	..	2	3	..	..	..	
Cancer of glands.......	..	..	..	1	2	1	1	4	Cancer of internal organs.
Dis. of parotid..........	2	..	..	..	..	..	..	..	
Goitre.................	..	..	1	4	..	3	..	..	
Total............	13	12	45	33	25	6	49	25	

5.—*Diseases of the Respiratory System.*

	Cured.		Relieved.		Unrelieved.		Died.		Registered Fatal Complications, &c.
	M.	F.	M.	F.	M.	F.	M.	F.	
Croup	1	..	1	..	..	..	5	2	Tracheotomy 2.
Laryngeal disease	..	1	..	1	3	..	..	..	
Laryngitis	..	1	2	1	..	..	2	1	{ Tracheotomy 2, gangrene of lung 1, pneumonia 1.
Aphonia	..	1	1	1	1	..	..	..	
Bronchial catarrh	1	2	2	..	1	..	..	..	
Bronchitis	8	7	14	14	2	1	4	4	{ Granular kidney 5, congestion of lung 2.
Asthma	..	..	2	..	..	..	..	..	
Pneumonia	5	3	4	2	..	..	2	3	
Congestion of lung	1	..	6	1	..	..	..	..	
Cirrhosis of lung	..	..	..	..	..	..	1	..	
Emphysema	..	..	2	..	..	..	1	..	
Pneumonic phthisis	..	..	..	..	1	..	1	1	
Pleurisy	9	3	2	1	..	1	1	..	Sloughing lung, pericarditis.
Chronic pleurisy	7	1	2	1	..	..	1	..	
Empyema	..	..	3	..	..	..	1	..	
Cancer of lung	..	..	..	..	..	..	1	..	
Broncho-pneumonia	2	..	..	..	..	..	..	1	
Pleuro-pneumonia	10	..	4	1	1	..	3	1	{ Small pox 1, dis. kidneys 1.
Bronchitis & emphysema	2	..	7	3	..	..	2	3	
Consolidated lung	..	..	1	..	..	..	..	..	
Dyspnœa	..	..	1	..	..	1	..	..	{ From previous tracheotomy.
Stone in larynx	..	1	..	..	..	..	..	..	
Tumour in trachea	..	..	1	..	..	..	..	..	
Total	46	20	55	26	9	3	25	16	

6.—*Diseases of the Digestive Organs.*

	Cured.		Relieved.		Unrelieved.		Died.		Registered Fatal Complications, &c.
	M.	F.	M.	F.	M.	F.	M.	F.	
Ulcer of lip	1	..	..	..	..	..	..	..	
Malformation of lip	3	..	1	..	1	..	..	..	
Cancer of lip	6	..	1	1	1	..	..	..	
Ranula	1	..	1	..	..	..	..	..	
Carious teeth	1	..	..	1	..	..	..	..	
Glossitis	1	..	..	..	..	..	..	..	
Cancer of palate	..	..	..	..	1	..	..	..	
Cancer of tongue	3	..	..	1	2	1	1	..	Sloughing of lung.
Sore throat	..	2	..	1	..	..	..	..	
Cynanche tonsillaris	2	3	..	..	..	..	..	..	
Tonsillitis	2	3	1	..	..	..	..	..	
Sloughing sore throat	..	..	..	..	..	..	1	..	
Cleft palate	..	..	2	..	4	1	..	..	
Œsophagitis	..	..	2	..	..	..	..	..	
Stricture of œsophagus	1	..	3	..	1	1	..	..	

Diseases of the Digestive Organs.—Continued.

	Cured.		Relieved.		Unrelieved.		Died.		Registered Fatal Complications, &c.
	M.	F.	M.	F.	M.	F.	M.	F.	
Cancer of pharynx and oesophagus	..	..	..	1	4	..	2	4	{ Sloughing of lung 3, pneumonia 1.
Foreign body in oesophagus	1	..	..	..	..	..	..	..	
Dysphagia	..	..	..	1	..	..	..	..	
Gastritis	..	..	1	..	..	..	..	..	
Ulcer of stomach	..	1	..	1	..	..	..	1	
Hæmatemesis	5	1	..	1	..	..	..	..	
Cancer of stomach	..	..	2	3	..	1	3	3	
Stomach, disease, various.	..	..	3	2	..	..	..	..	
Dyspepsia	1	4	3	6	1	1	..	..	
Gastrodynia	..	1	..	2	..	1	..	..	
Vomiting	1	3	..	..	..	2	..	..	
Enteritis	..	1	..	..	..	..	..	..	
Dysentery	8	..	5	..	..	..	..	..	
Stricture of intestine	..	..	..	..	..	..	1	1	
Cancer of intestine	..	..	..	..	..	..	1	..	
Internal strangulation	..	1	..	..	1	..	..	..	
Hernia	6	7	17	6	4	..	8	6	{ Pyæmia 1, chloroform and heart disease 1.
Parasitic disease	..	1	1	..	..	..	..	..	Tœnia.
Diarrhœa	2	2	2	1	1	1	..	..	
Lead colic	8	..	4	..	..	..	..	..	
Constipation	3	3	2	1	..	1	..	..	
Ulcer of rectum	1	..	1	3	..	2	..	1	Peritonitis.
Anal fistula	12	8	10	1	1	..	..	..	
Hæmorrhoids	1	2	8	3	1	2	..	..	
Prolapsus of rectum	1	..	..	1	..	1	..	..	
Stricture of rectum	..	2	1	6	2	1	..	1	Peritonitis.
Cancer of rectum	..	..	3	1	3	2	..	..	
Imperforate anus	..	..	1	1	..	..	..	..	
Congestion of liver	1	..	3	1	3	..	..	..	
Cirrhosis of liver	..	..	3	..	1	..	7	2	{ Morbus cordis 3, ascites 1, peritonitis 1.
Hydatid of liver	..	..	1	2	1	..	..	..	
Cancer of liver	..	..	..	..	..	..	3	1	
Abscess of liver	..	..	..	..	..	..	1	..	Lardaceous viscera
Atrophy of liver	..	..	..	..	..	..	2	..	
Jaundice	8	1	1	1	..	..	..	..	
Hypertrophy of spleen	..	..	2	1	1	2	..	..	
Cancer of peritoneum	..	..	..	..	..	..	..	1	
Peritonitis	6	3	2	3	..	1	2	1	{ Pleuro-pneumonia 1, perforation 1.
Ascites	..	..	1	1	1	2	1	1	
Abdominal tumour	1	..	2	2	4	4	..	.	
Disease of colon	..	..	..	..	1	..	1	..	Cancer.
Amyloid viscera	..	..	..	..	..	..	2	1	
Total	82	49	90	56	40	27	36	24	

7.—*Diseases of the Urinary Organs.*

	Cured.		Relieved.		Unrelieved.		Died.		Registered Fatal Complications, &c.
	M.	F.	M.	F.	M.	F.	M.	F.	
Bright's disease, chronic..	11	4	29	10	10	3	19	5	Lardaceous viscera 2, dilated heart 1, bronchitis 4, cirrhosis 1, meningitis 1, embolism 1.
" scarlatinal dropsy	11	7	3	3	..	..	3	1	
" contracted kidney	..	..	..	..	..	..	3	1	Apoplexy 2, morbis cordis 1, gout 1.
Pyelitis..............	1	..	2	..	..	..	1	..	Bronchitis.
Calculus in kidney......	1	..	3	..	..	1	..	..	
Hæmaturia renalis......	1	..	4	3	2	..	..	..	
Diuresis	..	..	..	1	1	..	..	..	
Cystitis...............	..	..	6	2	..	..	..	..	
Calculus, vesical........	15	1	6	2	3	1	2	..	Asthenia, peritonitis
Suspected calculus.......	1	..	1	1	..	..	..	..	
Irritable bladder	..	..	2	..	1	1	..	..	
Diseased bladder	..	..	6	..	2	2	..	..	
Incontinence of urine....	1	..	1	4	..	1	..	..	
Retention of urine......	..	..	5	1	..	..	..	..	
Diseased prostate, abscess	..	..	2	..	2	..	2	..	Pyelitis.
Urethritis and ulcer... ..	..	..	..	3	..	..	..	..	
Stricture of urethra......	25	..	68	..	6	..	5	..	Sloughing sores 2, pyæmia 1.
Urinary abscess	2	..	3	..	..	..	..	..	
Urinary fistula..........	3	..	..	..	2	..	..	..	
Abscess of penis.... ...	1	..	..	..	..	..	..	..	
Phymosis...............	16	..	4	..	..	..	..	..	
Paraphymosis...........	..	..	4	..	..	..	..	..	
Slough. scrotum & penis	..	..	2	..	..	..	..	..	
Cancer of scrotum & penis	3	..	2	..	1	..	..	..	
Hydrocele..............	5	..	20	..	..	..	..	..	
Varicocele	2	..	1	..	3	..	..	..	
Hæmatocele.............	2	..	..	..	..	..	..	..	
Orchitis................	3	..	7	..	..	..	..	..	
Diseased testicle........	1	..	2	..	1	..	..	..	
Malformation of bladder..	1	..	1	..	1	..	1	..	Exhaustion after operation.
Total............	106	12	184	30	35	9	36	7	

8.—*Disease of the Female Organs of Generation and Breast.*

	Cured.		Relieved.		Unrelieved.		Died.		Registered Fatal Complications, &c.
	M.	F.	M.	F.	M.	F.	M.	F.	
Encysted ovarian dropsy.	..	..	..	6	..	1	..	1	Peritonitis.
Diseased ovary	..	5	..	10	..	7	..	4	Peritonitis.
Pelvic cellulitis.........	..	2	..	1	..	..	..	2	
" hæmatocele......	..	2	..	6	..	..	..	1	
Leucorrhœa	..	3	..	5	..	..	..	..	
Abrasion of cervix......	..	2	..	2	..	..	..	..	
Ulcer of cervix..........	..	4	..	2	..	..	..	..	
Atrophy of uterus	..	..	..	..	..	1	..	..	
Hypertrophy of uterus...	..	1	..	4	..	..	..	..	
Fibrous tumour of uterus	..	1	..	8	..	3	..	1	
Uterine polypus.........	..	9	..	1	..	..	..	..	
Anteversion.............	..	1	..	2	..	1	..	..	
Retroversion	..	5	..	18	..	..	..	..	
Prolapsus...............	..	..	..	4	..	..	..	2	Pyelitis 1, pyæmia 1.
Vaginitis	..	..	..	2	..	..	..	..	
Occlusion of vagina......	..	1	..	1	..	..	..	..	
Vaginal fistula..........	..	2	..	5	..	3	..	..	
Recto-vaginal fistula	..	..	..	1	..	2	..	..	
Abscess of labium.......	..	2	..	..	..	..	..	..	
Vascular tumour on meatus .... }	..	4	..	..	..	..	..	..	
Amenorrhœa............	..	2	..	7	..	2	..	..	
Vicarious menstruation..	..	..	..	2	..	..	..	..	
Dysmenorrhœa..........	..	4	..	4	..	...	..	..	
Menorrhagia	..	3	..	4	..	..	..	..	
Pessary fixed in vagina..	..	2	..	..	..	..	..	..	
Uterine hæmorrhage....	..	3	..	..	..	..	..	..	
Pregnancy..............	..	2	..	3	..	1	..	..	
Abortion	..	2	..	2	..	1	..	..	
Obstructions to labour...	..	6	..	..	..	..	..	..	{ Deformed pelvis, Premature labour induced.
Ruptured perineum	..	8	..	..	..	..	..	..	
Iliac and pelvic abscess..	..	2	..	4	..	1	..	..	
Cancer of uterus........	..	3	..	16	..	8	..	14	
Uterine phlebitis	..	..	..	..	..	..	..	2	Pyæmia, 2.
Uterine disease (various)	..	3	..	2	..	1	..	..	
Uterine tumours (various)	..	1	..	2	..	5	..	..	
Breast, inflammation....	..	1	..	1	..	..	..	..	
Abscess of breast	..	4	..	4	..	..	..	..	
Cancer of breast.........	..	7	..	3	..	5	..	1	{ Gangrene and hæmorrhage.
Other tumours of breast	..	4	..	..	..	..	..	1	Inflammatory fever.
Total........	..	96	..	132	..	42	..	29	

9.—*Diseases of the Organs of Locomotion.*

	Cured.		Relieved.		Unrelieved.		Died.		Registered Fatal Complications, &c.
	M.	F.	M.	F.	M.	F.	M.	F.	
Bones—									
Ostitis	..	..	6	..	..	..	1	..	Pyæmia.
Periostitis	4	8	5	3	..	..	..	..	
Caries of cranium	..	..	..	..	..	..	1	..	Pyæmia.
" face and jaw....	..	..	4	1	..	..	..	..	
" upper extremity	2	..	2	..	..	..	..	..	
" hand	3	..	1	1	..	1	..	..	
" ribs	..	..	1	1	1	..	..	..	
" lower extremity	2	..	2	..	1	..	..	1	Amyloid disease.
" bones of foot....	3	2	5	3	1	1	..	..	Strumous ulcers.
Necrosis of cranium...	..	..	2	..	..	..	..	1	
" face and jaw ...	..	..	2	..	..	..	..	..	
" upper extremity	5	..	8	4	1	..	1	1	Pneum., erysipelas.
" pelvic bones....	..	..	1	..	..	..	..	..	
" lower extremity	6	..	18	4	2	2	1	..	Albuminuria.
" bones of foot...	..	2	3	..	2	..	..	..	
Exostosis	2	1	..	1	..	..	..	..	
Cancer of bone	..	..	1	..	3	..	..	..	
Joints—									
Acute synovitis	4	3	8	5	..	..	..	..	
Chronic synovitis	1	1	18	10	1	1	1	..	Gangrene.
Abscess of joint	..	..	1	..	..	..	..	..	
Anchylosis of joint....	..	..	3	..	1	..	..	..	{ Elbow 2, jaw 1, wrist 1.
Diseased hip	..	..	22	19	8	4	1	1	
" knee	5	2	14	13	6	1	1	1	Pyæmia 2.
" ankle	3	..	5	1	..	1	..	..	
" shoulder	..	..	..	..	1	..	..	..	
" elbow	1	1	6	5	3	1	1	..	Pneumonia.
" wrist	1	..	..	1	..	..	..	..	
Spine—									
Cancer of	..	..	..	..	..	..	1	..	
Caries and necrosis....	..	..	4	..	1	1	1	..	
Psoas & lumbar abscess	2	..	4	1	1	..	1	..	Phthisis.
Angular deformity....	..	..	..	..	4	..	..	..	
Lateral curvature	..	..	..	1	1	..	..	..	
Muscles and tendons—									
Progressive muscular atrophy	..	..	3	..	4	2	..	..	
Simple atrophy	..	..	1	..	1	..	..	..	
Contraction of tendons	1	..	1	1	..	1	..	..	
Relaxed tendons	..	..	..	1	2	..	..	..	
Club foot, varus	..	1	1	..	1	..	..	..	
" equinus	..	..	1	..	1	1	..	..	
Enlarged bursa patella	1	10	1	3	1	..	..	..	
Abscess of "	..	..	..	2	..	..	..	..	
Bunion	..	..	1	3	1	1	..	..	
Ganglion	..	..	..	3	..	2	..	..	
Enlarged bursa	..	..	1	..	..	..	..	..	
Total	46	26	156	87	49	20	11	5	

10.—*Diseases of Cellular Tissue.*

	Cured.		Relieved.		Unrelieved.		Died.		Registered Fatal Complications, &c.
	M.	F.	M.	F.	M.	F.	M.	F.	
Inflammation of cellular tissue	1	1	3	2	..	..	1	..	Pyæmia.
Abscess of head and neck	3	7	3	3	..	..	..	..	
" upper extremity...	2	1	3	3	1	..	..	..	
" lower extremity...	17	3	5	4	1	..	1	1	Exhaustion.
" chest and abdomen	4	..	4	2	1	..	..	..	
" back and pelvis....	8	..	7	1	1	1	1	..	Dis. vertebra.
Multiple abscess	..	..	1	..	1	1	..	2	
Slough and gangrene	1	..	1	1	..	1	2	1	Pyæmia 3.
Sinus, various parts	1	..	3	1	2	..	..	..	
Total	37	12	30	17	7	3	5	4	

11.—*Diseases of the Skin.*

	Cured.		Relieved.		Unrelieved.		Died.		Registered Fatal Complications, &c.
	M.	F.	M.	F.	M.	F.	M.	F.	
Erythema	..	3	..	..	..	..	..	..	
Roseola	..	1	..	..	..	..	..	..	
Dermatitis	..	1	..	..	..	..	..	..	
Psoriasis and lepra	1	1	1	4	..	..	..	..	
Herpes	1	..	..	..	..	..	..	..	
Pemphigus	2	..	1	1	..	1	..	..	
Eczema	5	2	7	4	1	..	..	..	
Rupia	..	1	..	1	..	..	..	..	
Icthyosis	..	..	1	..	..	..	..	..	
Xeroderma	..	..	..	1	..	..	..	..	
Leucoderma	..	..	..	1	..	..	..	..	
Cancer of skin	3	..	1	2	..	..	1	..	Cancer of lung.
Pityriasis	1	..	..	..	..	..	..	..	
Urticaria	2	..	..	..	..	..	..	..	
Ulcers of leg	12	24	44	28	5	3	..	1	Erysipelas.
" other parts	1	..	3	1	..	..	1	..	Hæmorrhage.
Gangrene of skin	..	1	..	..	..	..	..	..	
Carbuncle	4	1	..	1	..	..	1	..	Pyæmia.
Onychia	1	2	1	1	..	..	..	..	
Thecal inflammation	4	..	1	2	..	..	1	..	
Senile gangrene	..	..	..	..	..	..	1	1	Pyæmia 1.
Elephantiasis	..	..	1	..	1	.	..	..	
Cicatrices from burns....	1	..	1	4	..	3	..	..	
" other causes...	1	1	..	..	..	..	..	..	
Tinea Favosa	..	..	..	1	..	2	..	..	
Irritation from ointment..	1	..	..	..	..	..	..	..	
" ingrowing toe nail	1	..	..	..	..	..	..	..	
Scabies	4	..	..	..	..	..	..	..	
Total	45	38	62	52	7	9	5	2	

12.—*Miscellaneous Returns.*

	Cured.		Relieved.		Unrelieved.		Died.	
	M.	F.	M.	F.	M.	F.	M.	F.
Debility	3	1	..	9	1	1	..	..
Destitution..............	2	..	..	..	.	..	..	..
Disease unascertained....	..	..	..	..	2	..	..	..
Nothing wrong	1	..	1	1	1	..	..	..
Convalescence from } disease............. }	..	3	..	..	..	..	..	..
Total............	6	4	1	10	4	1	..	..

13.—*Poisons and General Injuries.*

	Cured.		Relieved.		Unrelieved.		Died.		Registered Fatal Complications, &c.
	M.	F.	M.	F.	M.	F.	M.	F.	
Poisons, Mineral—									
Am. chloride of mercury	..	1	..	..	..	..	..	..	
Carbolic acid.........	1	..	..	..	..	..	..	..	
Oxalic acid	1	1	..	..	..	..	..	..	
Phosphorus	..	1	..	..	..	..	..	..	
Acetate of lead........	..	2	..	..	..	..	..	..	
Chloride of zinc.......	..	..	1	..	..	..	..	..	
Vegetable Poisons—									
Opium...............	..	2	..	..	..	..	..	..	
Indigo...............	1	..	..	..	..	..	..	..	
Croton seeds..........	1	..	..	..	..	..	..	..	
Alcoholism, acute and } chronic.......... }	4	..	..	..	..	..	1	..	
Supposed poison......	..	..	..	..	..	..	..	1	{ Granular kidneys, apoplexy.
Poisoned wounds......	1	..	1	..	..	..	1	..	Septicæmia.
General Injuries—									
Burns and scalds.......	13	8	6	1	..	..	6	6	
Multiple injury.......	..	..	..	..	..	..	2	..	Railway smash.
Asphyxia, drowning...	6	2	2	1	..	..	2	1	Pneumonia.
Total............	28	17	10	2	..	..	12	8	

14.—*Local Injuries.*

	Cured.		Relieved.		Unrelieved.		Died.		Registered Fatal Complications, &c.
	M.	F.	M.	F.	M.	F.	M.	F.	
Head and face—									
Contusion	6	1	3	2	..	..	1	..	Compress. of brain
Scalp wound	13	1	5	1	..	..	1	..	
Concussion of brain	35	1	7	..	1	..	..	..	
Fractured skull	4	1	2	..	..	..	11	2	
Fractured base of skull	1	..	..	..	..	..	1	..	
Sequelæ of fract. skull	..	..	..	..	1	..	..	..	
Contusion of face	1	1	1	..	..	..	..	..	
Wound of face	2	..	..	..	..	..	..	..	
Fractured bones of face	2	..	..	..	..	..	..	..	
Ununited bones of face	..	..	1	..	..	..	..	..	
Neck—									
Contusion	2	1	1	..	..	..	..	..	
Cut throat	..	2	2	1	..	..	1	..	Broncho-pneumonia
Sprain of neck	1	..	..	..	..	..	..	..	
Chest—									
Contusion of chest	6	2	5	1	..	..	..	..	
Fractured ribs	9	1	6	1	..	..	..	1	Dis. kidneys.
" with injured lung	1	..	..	..	..	..	5	1	
Dislocated clavicle	..	..	1	..	..	..	..	..	
Back—									
Contusion	14	3	15	..	2	..	..	..	
Sprain	1	..	1	..	1	..	..	..	
Fractured spine	..	..	..	..	1	..	6	..	Pneumonia 1.
Concussion of spine	..	..	1	..	..	..	..	..	
Injury to spinal cord	1	..	..	..	..	..	..	..	
Abdomen—									
Contusion	7	1	4	..	..	..	..	..	
Ruptured viscera	..	..	..	..	..	..	5	..	
Wound of parietes	2	..	..	..	..	..	..	..	
Pelvis—									
Contusion	5	2	1	..	..	..	..	..	
Wound of perineum	4	..	3	..	..	..	1	..	Hæmorrhage.
Ruptured perineum	2	..	..	1	..	2	..	..	
Fractured pelvis	5	..	1	..	..	..	1	..	Internal injury.
Ruptured kidneys	..	..	..	..	..	..	1	..	
Upper extremity—									
Contusions	2	1	1	..	..	..	..	..	
Wounds	5	1	8	2	..	..	2	..	Tetanus 1, delirium 1.
Injury to shoulder	..	1	2	..	..	..	..	..	
" wrist	..	..	1	..	..	..	..	..	
" elbow	2	..	3	..	..	..	..	..	
Fracture of clavicle	..	..	3	..	..	..	..	..	
" scapula	..	..	2	..	..	..	..	..	
" humerus	5	..	..	..	1	..	1	..	Pyæmia.
Co. fracture, humerus	2	1	2	..	..	..	..	..	
Fracture of forearm	..	..	1	1	..	..	..	..	
Co. fracture, forearm	4	1	..	..	..	..	1	..	Tetanus.
Co. " bones of hand	14	1	8	2	..	..	..	..	
Ununited frac. of radius	..	..	1	..	..	..	..	..	
Dislocated shoulder	1	..	1	..	..	..	1	..	
" elbow	2	..	..	1	..	..	..	..	
Bite of thumb	1	..	..	..	..	..	..	..	
Dislocation of thumb	..	..	1	..	..	..	..	..	
Lower extremity—									
Contusions	14	2	5	1	..	..	1	..	Erysipelas ext.
Sprain of ancle	5	1	9	2	1	..	..	..	
Wound	7	1	4	1	..	..	..	..	

Local Injuries—Continued.

	Cured.		Relieved.		Unrelieved.		Died.		Registered Fatal Complications, &c.
	M.	F.	M.	F.	M.	F.	M.	F.	
Lower extremity—									
Injury to hip...........	1	..	2	4	..	..	..	..	
" knee........	17	2	6	1	..	..	..	..	
" ankle	7	..	3	1	..	..	..	..	
" foot........	1	1	..	..	..	..	..	..	
Fracture of femur.....	40	7	..	1	..	..	..	..	
Co. fracture of femur..	5	..	..	..	..	..	3	1	Pyæmia 1, embolism 1, hæmorrhage 1.
Fract. of cervix femoris	4	4	2	7	..	2	..	1	Fatty degeneration
Fracture of patella....	8·	6	4	2	..	..	..	..	
Fract. of tibia and fibula	67	15	24	5	..	..	..	..	
Co. frac. "	11	2	2	..	..	..	4	..	Tetanus 1, empyema 1, pneumonia 1, pyæmia 1.
Fracture, fibula only...	20	3	2	..	..	..	..	..	
Co. frac. "	..	1	..	..	..	..	..	..	
Fracture bones of foot..	..	..	2	..	..	..	..	..	
Co. fract. " ..	3	1	1	..	..	..	1	..	Septicæmia.
Dislocation of hip.....	..	..	1	..	..	..	..	..	
" ankle....	1	..	1	..	..	..	..	..	
Ununited tibia.........	..	..	2	..	1	..	..	..	
Separation of epiphyses	1	..	..	..	..	..	..	..	
Needle in calf of leg...	..	1	..	..	..	..	..	..	
Total...........	374	70	164	38	9	4	48	6	

Causes of the Accidents, with the Mortality, distinguishing the Sexes.

CAUSES OF THE ACCIDENTS.	Total cases.	Discharged.		Died.		Remaining.	
		M.	F.	M.	F.	M.	F.
Accidents on the river.......................	39	30	1	4	..	4	..
Assaults................................	19	9	6	1	..	..	3
Attempts at suicide (excluding poison)...........	18	7	7	3	1	..	..
Bites and kicks of animals—horse and donkey....	5	4	..	..	..	1	..
Burns from clothes taking fire..................	19	1	1	7	6	1	3
" from heated fluids......................	26	14	8	2	..	1	1
" from explosion of gas....................	..	..	..	..	..	..	..
" from explosion of gunpowder..............	1	..	..	..	..	1	..
Collisions between opposing forces..............	8	5	..	1	..	1	1
Collisions with street vehicles and horses........	129	80	15	11	5	16	2
Cuts and blows from sharp instruments and missiles	35	26	5	3	..	1	..
Falls down stairs............................	41	19	18	..	1	1	2
Falls from a height..........................	141	111	14	6	..	10	..
Falls on the ground.........................	148	90	29	5	2	15	7
Falls of heavy weights.......................	70	56	5	5	..	4	..
Foreign bodies in throat and nose..............	4	1	2	..	..	..	1
Gunshot wounds...........................	1	1	..	..	..	..	..
Machinery accidents.........................	33	24	2	3	..	3	1
Poisoning, accidental........................	4	4	..	..	..	..	..
Poisoning, intentional.......................	10	2	7	..	1	..	..
Railway accidents...........................	24	17	..	5	..	2	..
Torsions of body...........................	13	4	4	4	..	..	1
Total...........................	788	505	124	60	16	61	22

Table of Amputations.

AMPUTATIONS.	Total M. & F.	Ages of Cured.	Ages of Deaths.	Cured		Dead		FATAL COMPLICATIONS.
				M.	F.	M.	F.	
PRIMARY, FOR INJURY.								
Arm,	1	26	:	1	:	:	:	
Forearm,	1	18	:	:	1	:	:	
Fingers, one or more,	8	:	:	8	:	:	:	
Both Thighs,	1	:	20	:	:	1	:	Multiple injury.
Thigh,	1	30	:	1	:	:	:	
Leg,	1	:	28	:	:	1	:	Empyema.
At Ankle Joint,	1	52	:	1	:	:	:	
Foot (Chopart),	1	:	25	:	:	:	1	Cellulitis and septicæmia.
SECONDARY, FOR INJURY.								
Fingers,	1	:	:	1	:	:	:	
Thigh,	2	31, 27	:	2	:	:	:	
Leg,	2	25, 43	:	2	:	:	:	
AMPUTATION FOR DISEASE.								
Fingers,	10	41	:	8	2	:	:	
Part of Hand,	2	52	36	1	:	:	1	Erysipelas.
At Elbow Joint,	1	:	:	1	:	:	:	
Thigh,	10	{5, 9, 12, 21, 18, 31, 42.}	17, 20, 36	6	1	2	1	Pyæmia, 3. Acute gangrene, 1.
At Knee Joint,	2	38	8	1	:	1	:	Extension of cancer.
Leg,	4	16, 16, 33, 60	:	1	3	:	:	
Ankle Joint,	1	52	:	1	1	:	:	
Great Toe,	3	..	:	2	:	:	:	
	53			37	8	5	3	

Miscellaneous Operations.

	Cured M	Cured F	Unrelieved M	Unrelieved F	Dead M	Dead F	Fatal Complications	Remarks
Excision of Diseased Parts—								
Cancerous tumours of mamma...		8				1	Gangrene and hæmorrhage	
Adenocele of mamma...		3						
Encysted tumour of mamma...	9							
Cancer of lip...	1					1	Inflammatory fever	
" tongue...								
" other external parts...	6	2						Hand 2, arm, back, face, head, scrotum and penis.
Non-malignant tumours of various external parts. (Encysted 8, fatty 5, fibrous 4, enchondroma 4, warty 4, glandular 2, bursal 2)...	15	12			1	1	Gangrene 1, exhaust. after oper. 1	Face 7, jaw 3, back 4, shoulder 2, arm 2, hand 1, neck 2, thigh 3, patella 2, heel 1, head 2.
Excision of tumour in pharynx...			1					Tracheotomy.
" elbow-joint...	2	3						Cheek 1, hand 1, neck 1.
" part of tongue...	1				1		Sloughing of lung	
" nævus...	2	2						
" testicle...	3				1		Albuminuria and hæmorrhage	
" cancerous penis...	2							
" nerve, irritable stump...								
Diseased Bones—								
Exostosis...	1	1						Femur 1, finger 1.
Head of femur...	1							Caries and dislocation.
Necrosed femur...	4	1			2	1	Amyloid viscera, albuminuria	Caries and necrosis.
Tibia...	8	1						Hypertrophy of bone.
Astragalus...	1							Necrosis.
Fibula...	1							Caries and necrosis.
Bones of foot...	4							Necrosis.
Great toe...	3	1						Caries and necrosis.
Radius and ulna...	2	1						Necrosis.
Humerus...	1							Caries and necrosis.
Scapula...								Necrosis.
Clavicle...	1							"
Jaw...	8	1			1		Pneumonia	"
Cranial bone...	1							Epulis 1, necrosis.
Hypertrophied lip...								
" labium...	1	1						
" prepuce...								
Hæmorrhoids...	5	3						

Operation							Cause of death	Remarks
Ligatures of Blood Vessels—								
Lingual artery	:	:	:	1	:	:	:	Hæmorrhage from tongue.
External iliac	:	1	:	:	:	1	:	Aneurism femoral artery.
Veins	:	:	:	:	:	1	:	Varicocele.
Hæmorrhoids	:	:	:	:	1	2	:	
Pressure of femoral artery, popliteal aneurism	:	:	:	:	:	1	:	16 hours, clamp.
Pressure for external iliac aneurism	:	:	:	:	:	1	:	
" post tibial aneurism	:	1	:	1	:	1	Extravasation	Retention of urine, stricture 6, ruptured urethra 2, fistula 4.
Puncture of bladder per rectum	:	1	:	:	:	4	Sloughing perineum	
Perineal section	:	1	:	1	:	2	:	Tal. equin. and tal. varus.
Tenotomy	:	:	:	:	:	1	:	Radius, pegging ends of bone.
Operation for ununited fracture	:	:	:	:	:	1	:	
Attempt at reduction of dislocation	:	:	:	1	:	1	:	Femur, 9 months since accident.
Lithotomy	:	2	:	1	:	13	Asthenia 1, peritonitis 1	
Lithotrity	:	:	1	1	1	2	:	
	:	:	:	2	:	1	:	Cleft palate.
	1	:	:	:	:	1	:	
Malformation of bladder	1	1	:	:	1	8	:	
" urethra	:	:	1	:	:	1	Exhaustion from operation	Urethrotomy.
Ruptured perineum	:	:	:	:	5	:	:	
Contracted skin from burns	:	:	:	:	4	3	:	Neck 1, knee 1, arm 2, elbow 1, hand 2.
Ovariotomy	3	:	:	:	5	:	Peritonitis	Scald 1, erysipelas of fauces.
Elevation, depressed bone	:	1	:	:	:	:	Compound fractured cranium	Scald 1, œdema 1, croup 2, laryngitis 2, cancer of mouth 1.
Laryngotomy	:	1	:	:	:	:	Tetanus, erysipelas	
Tracheotomy	1	5	:	1	:	1	2, croup	
Operations for Hernia—								
Umbilical—taxis	:	:	:	:	:	1	:	Sac opened 1, sac not opened 1.
" herniotomy	1	1	:	:	:	:	:	Reduced by taxis.
Inguinal hernia	1	1	:	:	:	11	Chloroform and morbus cordis	
" herniotomy	4	:	:	1	3	Strict. intestine 1, pyæmia 1, peritonitis	Sac opened.
Femoral hernia	:	1	:	:	5	:	Gangrene of intestine	Reduced by taxis.
Herniotomy	1	:	:	2	:	Peritonitis 3	Sac opened.
"	1	:	:	2	:	Pneumonia, peritonitis	Sac not opened.
Total	16	27	1	9	67	141		

Eye Operations, 1869.

Compiled by Mr. Percy Kingsford, Ophthalmic Dresser.

	Cured.		Relieved.		Unrelieved.		Under Treatment.		Eye.			Total.
	M.	F.	M.	F.	M.	F.	M.	F.	Right.	Left.	Both.	
Orbit—												
Removal of tumour from }	..	2	..	..	..	..	..	..	1	1	..	2
Eyeball—												
Excision	11	3	4	..	..	..	..	..	15	6	..	21
Abscission	2	..	..	3	..	..	..	..	1	1	..	2
Staphyloma	4	1	..	..	..	..	..	..	4	1	..	5
Removal of foreign body }	..	.	1	..	..	..	..	..	..	1	..	1
Eyelids—												
Tumour of lid	..	1	..	..	..	..	..	..	..	1	..	1
Ectropion	1	1	1	1	1	..	..	..	3	2	..	5
Entropion	2	..	..	1	..	..	..	..	1	2	..	3
Trichiasis	1	..	1	..	..	..	1	..	1	2	..	3
Lachrymal apparatus—												
Tumour of sac	..	..	1	..	..	..	..	..	..	..	..	1
Opening sac	..	..	1	2	..	..	..	..	1	1	1	4
Slitting lower canaliculi }	..	1	7	6	..	..	..	..	7	6	1	15
Conjunctiva—												
Symblepharon	..	..	2	..	..	..	..	..	..	1	1	3
Plastic op. pterygium	..	..	1	..	..	..	..	..	1	..	..	1
Strabismus—												
Convergent	28	11	34	41	..	..	..	2	14	18	42	116
Divergent	3	4	..	..	..	..	..	..	3	4	1	8
Cataract—												
Extraction, ordinary	36	14	10	9	4	..	5	3	26	21	32	123
Needle operation	4	3	2	3	..	..	..	..	6	4	2	13
Suction	..	..	3	1	..	..	..	..	2	1	2	5
Opaque capsule removed }	..	..	1	1	..	..	..	..	..	..	..	2
Iris—												
Artificial pupil	1	..	12	16	..	1	1	..	6	11	14	45
Iridectomy	7	2	34	38	3	3	7	1	17	11	44	116
Corelysis	..	..	1	1	..	..	..	..	1	1	..	2
Cyst in iris	..	..	..	..	1	..	..	..	..	1	..	1
Conical cornea, operation for }	..	..	..	1	..	..	..	..	1	..	..	1

Retrospective Summary of Patients Relieved during the Year 1869.

	Males.	Females.	Total.
Patients treated in the wards of the hospital	3,145	2,019	5,164
Out-patients—			
Surgical, ordinary	1,736	1,919	3,655
Medical, ordinary	1,580	1,800	3,380
Diseases of women	..	1,708	1,708
Diseases of the eyes	1,795	1,980	3,775
Diseases of the ear	425	488	913
Diseases of the skin	520	527	1,047
Medical casual or slight cases	4,089	7,063	11,152
Surgical casual or slight cases	20,980	17,840	38,820
Minor accidents and urgent surgery cases	5,458	1,861	7,319
Tooth extractions	1,046	930	1,976
Midwifery patients	..	1,929	1,929
Total	40,774	40,064	80,838

OUT-PATIENT DEPARTMENT, 1869.

The following numbers include such patients as were furnished with cards and prescription papers, to enable them to continue their attendance for a period of two months:—

	Males.		Females.		Total.
Ordinary medical cases	1,580	....	1,800	....	3,380
Ordinary surgical cases	1,736	....	1,919	....	3,655
Diseases peculiar to women	..	....	1,708	....	1,708
Diseases of the eyes	1,795	....	1,980	....	3,775
Diseases of the ear	425	....	488	....	913
Diseases of the skin	520	....	527	....	1,047
Total	6,056	....	8,422	....	14,478

Besides the above, there were prescribed for in the out-patient rooms by the house physicians and senior students—

	Males.		Females.		Total.
Medical patients	4,089	....	7,063	....	11,152
Surgical patients	20,980	....	17,840	....	38,820
Total	25,069	....	24,903	....	49,972

The number of minor accidents and urgent cases attended to in the surgery, and not admitted to the wards, amounted during the last year to 7,319—of which 5,458 were men, and 1,861 were women and children.

Dental cases attended to in the surgery were 1,976 : males, 1,046; females, 930.

The number of women confined and attended to at their respective places of abode amounted to 1,929.

DETAILS OF MIDWIFERY DEPARTMENT.

Number of women confined during the year			1,929
Number of single births, 1,906; twin births, 23. Total children			1,952
Living male children		961	
Living female children		896	
Dead males		58	
Dead females		37	
			1,952

1871 of the above children presented naturally at birth, 45 were cases of breech presentation, 17 footling, 10 face, 9 arm and hand.

Among the mothers 5 deaths are reported to have arisen from the following causes—heart disease 2, pneumonia 1, broncho-pneumonia 1, and exhaustion from no special cause 1.

Version was had recourse to in 9 cases, the use of the forceps in 15, and craniotomy was performed in 2 cases.

Among the mothers there were in their

1st confinement 252					1,809
2nd " 339	10th confinement ..	..	..		63
3rd " 287	11th " ..	..	..		25
4th " 247	12th " ..	..	..		14
5th " 195	13th " ..	..	..		11
6th " 171	14th " ..	..	..		3
7th " 122	15th " ..	..	..		2
8th " 116	16th " ..	..	..		2
9th " 80					
1,809	Total 1,929				

Retrospective Summary of all the Patients Treated in Guy's Hospital since 1860.

	1860.	1861.	1862.	1863.	1864.	1865.	1866.	1867.	1868.	1869.
IN-PATIENTS.										
Under treatment during the year	5,128	5,360	5,371	5,507	5,511	5,715	5,510	5,245	5,297	5,164
Discharged well or convalescent	2,627	2,553	2,443	2,500	2,538	2,622	2,389	2,109	2,237	1,682
Relieved	1,174	1,431	1,525	1,539	1,504	1,633	1,515	1,532	1,551	2,047
Unrelieved	414	309	346	367	419	400	390	483	411	470
Discharged for special reasons	...	126	87	89	61	71	189	146	116	...
Died	420	458	468	486	480	488	534	509	466	496
Rate of mortality per cent	9·61	9·39	9·61	9·75	9·58	9·35	10·64	10·65	9·72	10·56
Average number daily resident	489	509	494	505	497	501	496	502	498	487
Mean residence of each in days	34·8	34·6	33·57	33·47	32·92	31·99	32·85	34·93	34·31	34·42
Number of accident cases admitted	656	713	810	866	875	1,051	907	911	805	788
Number of deaths from accident	76	78	94	160	109	102	97	101	83	76
Number of ordinary operations registered	334	287	315	314	301	337	342	362	417	314
Number of deaths after operations	45	44	44	62	66	65	60	69	70	51
Number of ophthalmic operations	60	55	226	501	492	656	606	638	624	499
OUT-PATIENTS.										
Surgical cases	2,875	3,091	3,025	3,403	3,851	3,749	3,807	4,125	3,905	3,655
Medical cases	3,943	3,247	3,769	3,905	3,731	2,987	3,129	3,438	3,456	8,380
Diseases of the eyes	1,480	1,675	2,812	2,348	2,477	2,312	2,461	2,914	3,614	3,775
Diseases peculiar to women	1,822	1,903	1,899	1,753	1,762	1,635	1,703	1,736	1,675	1,708
Diseases of the skin	...	...	...	232	493	847	684	801	1,048	1,047
Diseases of the ear	...	...	...	394	767	826	731	757	960	913
Casual or minor medical cases	27,858	6,608	7,466	10,140	10,347	9,747	10,045	10,414	10,679	11,152
Casual or minor surgical cases		26,674	33,210	39,380	38,375	33,446	32,827	37,985	41,150	38,820
Tooth extractions	...	4,030	4,821	4,544	5,299	4,789	5,141	4,748	3,655	1,976
Minor accidents	1,669	1,548	4,376	3,838	6,109	6,500	6,080	6,444	6,390	7,319
Women confined at their own houses	1,404	1,055	1,091	1,576	1,608	1,608	1,585	1,727	1,783	1,029

LIST

OF

GENTLEMEN EDUCATED AT GUY'S HOSPITAL,

WHO HAVE PASSED THE

EXAMINATIONS OF THE SEVERAL UNIVERSITIES, COLLEGES,

&c. &c.,

IN THE YEAR 1870.

University of Oxford.

First examination for the degree of Bachelor of Medicine.
W. H. A. Jacobson, B.A.

University of Cambridge.

JUNE.

Final examination for the degree of Bachelor of Medicine.
W. T. P. Douglas, B.A. | B. N. Earle, M.A.

First examination for the degree of Bachelor of Medicine.
C. Oldman, B.A.

DECEMBER.

Second Examination for the degree of Bachelor of Medicine.
R. Galabin, M.A.

First examination for the degree of Barhelor of Medicine.
D. W. C. Hood.

University of London.

Examination for the degree of Doctor of Medicine.
John de Liefde, M.B. | Frederick Taylor, M.B.[1]

Final examination for the degree of Bachelor of Medicine.
W. F. R. Burgess.[2] | John de Liefde.[3]
A. W. Smith.[4]

[1] Obtained marks sufficient to qualify for the Gold Medal.
[2] Obtained Second Class Honours in Medicine; First Class Honours and Gold Medal in Forensic Medicine; First Class Honours and Gold Medal and marks sufficient to qualify for the Scholarship in Obstetric Medicine.
[3] Obtained Second Class Honours in Medicine; First Class Honours in Obstetric Medicine.
[4] Obtained Second Class Honours in Forensic Medicine; Third Class Honours in Obstetric Medicine.

Examination for the degree of Bachelor of Surgery.
J. R. Stocker, M.B.[1]

First examination for the degree of Bachelor of Medicine.[3]
First Division.
E. G. Russell.[2]

Second Division.

| C. H. Golding Bird, B.A. | Thomas Eastes. |
| B. N. Dalton. | G. H. Percival. |

Excluding Physiology.
Second Division.
W. Williams.

Preliminary Scientific M.B. Examination.[3]
First Division.

| H. J. F. Groves. | H. J. Hetley. |
| S. H. Vines. | |

Second Division.

| W. H. Lamb. | F. J. M. Palmer. |
| J. A. Rigby. | |

Indian Medical Service.

| O. T. Duke, M.B.[4] | T. C. H. Spencer. |

Naval Medical Service.

F. W. Laslett.

[1] Obtained Honours in Surgery.

[2] Obtained First Class Honours and Gold Medal in Anatomy; First Class Honours in Physiology and Comparative Anatomy; First Class Honours in Chemistry; First Class Honours in Materia Medica.

[3] In last year's list the following Honours obtained at the Examinations of the University of London were accidentally omitted :

First Examination for the Degree of Bachelor of Medicine.

H. E. Southee obtained First Class Honours, Exhibition and Gold Medal in Pharmaceutical Chemistry and Materia Medica; First Class Honours and Gold Medal in Anatomy.

Thomas Jones obtained First Class Honours and Gold Medal in Pharmaceutical Chemistry and Materia Medica; and Second Class Honours in Anatomy.

J. T. Ingoldby obtained First Class Honours in Pharmaceutical Chemistry and Materia Medica.

Preliminary Scientific M.B. Examination.

E. G. Russell obtained Second Class Honours in Zoology; Third Class Honours in Chemistry and Natural Philosophy; and Second Class Honours in Botany.

Thomas Eastes obtained Second Class Honours in Botany.

G. T. Bettany obtained Third Class Honours in Botany.

[4] Obtained the highest place in the list of successful candidates; and received the Herbert Prize.

Royal College of Physicians, London.

Examination for the Licentiateship.

C. J. Oldham.
H. E. Waddy.
A. A. Thomas.

E. W. Way.
A. Cooper.
W. Paulson.

W. E. Saunders.

Royal College of Physicians, Edinburgh.

E. H. Downing. | M. T. Kavanaugh. | J. H. Morton.

Royal College of Surgeons.

Final examination for the Fellowship.

J. N. C. Davies-Colley, M.A., M.C.
J. Woodman.

W. Stanger.
F. E. Manby.

First examination for the Fellowship.

J. T. Mackenzie.
J. Woodman.
W. Stanger.
J. N. C. Davies-Colley, M.A., M.C.
H. E. Southee.
J. A. Sharp.
W. Williams.

T. D. Harries.
Douglas W. Duke.
G. C. Hall.
J. E. Edwards.
E. G. Russell.
T. K. Clarke, M.A.
A. Buchanan.

Examination for the Licentiateship in Midwifery.
S. Walker.

Final Examination for the Membership.
January, 1870.

L. S. Cogan.
E. H. Downing.
R. F. Stephens.
Regd. Taylor.
H. G. Turner.

C. D. Maynard.
C. J. Oldham.
W. B. Taylor.
H. E. Walker.
B. B. Connolly, B.A.

R. R. Frost.
A. Gillingham.
J. P. Grover.
W. D. Lovell.

April.

J. P. Allwood.
W. L'H. Blenkarne.
H. Chabot.

A. Cooper.
A. R. Manby.
John Morris.

S. F. Murphy.
H. E. Waddy.
S. Walker.

F. Wicks.

May.

E. L. Collins.
H. G. Peacock.
E. W. Alabone.

W. A. D. Fasken.
R. Galpin.
W. H. Jalland.

T. Jones.
W. P. Yates.
J. Phillips.

July.

J. Hasard.
J. T. Ingoldby.
H. H. J. Nicholls.
C. E. S. Perkins.

S. Stickland.
E. G. Tennant.
E. W. Way.
H. E. Dixon.

H. Hibberd.
H. E. Hudson.
A. W. Smith, M.B.
G. E. K. Thorpe.

F. S. Tuck.

November.

G. P. Applin.
W. Beatson.
W. F. R. Burgess, M.B.
J. E. B. Burroughs.
W. E. Crowther.
W.T.P. Douglas, B.A., M.B.
W. Garratt.
M. Harris.

F. G. Larkin.
A. E. B. Love.
H. D. Palmer.
A. M. Branfoot.
W. Buchanan.
E. B. Evans.
W. J. Johnson.
J. Bunting.
H. G. Button.

G. A. Coombe.
T. A. Crackle.
W. Eager.
A. H. Evans.
J. Jolliffe.
T. W. Lacey.
T. H. B. Rodwell.
H. C. Turner.
W. A. E. Waller.

First examination for the Membership.

January, 1870.

W. C. Blaker.
F. J. de Lisle.

R. A. Lithgow.

C. J. W. Pinching.
E. H. Steele.

April.

R. Dunstan.
T. R. Edmundson.
G. E. Power.
H. O. Taylor.
Jas. Utting.
H. S. Branfoot.
H. G. Cartwright.
Thos. Eastes.
C. D. Fenn.
T. D. Harries.
F. Lungley.
John Marshall.
R. H. Paterson.
G. F. K. Smith.

G. Turner.
H. G. Bird.
T. Elam.
T. W. Jackson.
A. C. James.
H. R. Ker.
G. H. Percival.
E. Fyson.
F. Wacher.
W. A. Bailey.
G. J. Llewellin.
C. H. A. Stone.
J. J. Bowes.
Thomas Dawson.

G. W. Graham.
E. C. Rogers.
H. W. Stuart.
W. E. Hacon.
H. M. Langdale.
F. T. Maisey.
J. McD. Tudge.
D. M. B. Wheeler.
B. H. Williams.
W. W. Dickenson.
Chas. Jackson.
E. A. Burgess.
M. S. Duke.

May.

J. W. Scott.
G. E. Sealey.

D. Price.
W. Wallis.
R. H. Hughes, B.A.

E. S. Robson.
H. A. Latimer.

July.

F. G. A. Rogers.
E. Cullen.
C. A. G. Barrow.
J. P. Brumwell.
T. L. Tims.

E. F. Thomas.
A. R. Dunnage.
V. D. W. Jones.
J. L. Morley.
W. E. Bennett.

N. B. Elliott.
C. F. Bryan.
W. H. Spurgin.
T. H. Fagg.
J. Morris.

November.

C. Oldman, B.A.
W. Rendall.

T. D. Ransford.
W. Dryland.

W. Williams.
D. Murdoch.

Apothecaries' Society.

Final Examination for the Licentiateship.

December, 1869.

B. B. Connolly, B.A.
W. Eager.

C. H. W. Parkinson.
H. G. Turner.

January, 1870.

J. Jolliffe.

W. F. Flowers, M.A.,
   M.B.

F. Taylor, M.B.

R. Taylor.

H. E. Walker.

H. G. Button.

W. T. Law.

February.

W. Stanger.

G. A. Coombe.

G. C. Birt.

E. C. R. Roose.

March.

W. L'H. Blenkarne.

John de Liefde.

R. Paramore.

W. E. Crowther.

H. B. Bailey.

R. C. Holman.

H. W. Collins.

W. Russell.

E. E. Cass.

April.

G. H. Cable.

C. E. S. Perkins.

R. R. Frost.

R. Galpin.

C. J. Oldham.

W. C. Blaker.

R. E. Grigson.

T. G. Lidbetter.

June.

J. Hasard.

J. Phillips.

F. S. Tuck.

A. H. Evans.

H. H. J. Nicholls.

July.

T. A. Crackle.

H. E. Southee.

August.

S. Walker.

W. F. R. Burgess.

S. Hosegood.

J. R. Joseph.

September.

W. Greaves.

A. K. Newman.

October.

F. E. Newington.

S. F. Murphy.

November.

J. Marshall.

A. E. B. Love.

G. Willan.

E. G. Russell.

First Examination for the Licentiateship.

January, 1870.

C. E. Aikin. | B. Rix. | E. W. Way.

February.

R. F. Grant.

B. P. Morison.

W. Perkins.

James Reed.

March.

F. E. Newington.

G. H. Cable.

C. S. Ticehurst.

J. R. Joseph.

F. G. Passmore.

April.

B. H. Williams.

E. G. Russell.

H. J. W. Barrow.

F. E. Barrow.

June.
J. McD. Tudge.

July.

T. B. Donahoo.   R. H. Paterson.
T. R. Edmundson.   D. M. B. Wheeler.

A. C. James.

August.

W. Rendall.   T. W. Jackson.
C. D. Fenn.   F. D. Grayson.

F. T. Maisey.

September.

J. Shaw.   F. Wacher.

October.

T. D. Ransford.   E. A. Burgess.   E. E. Rastrick.
J. J. Bowes.   J. Marshall.   H. W. Stuart.

November.

R. Dunstan.   A. Matcham.   G. J. Sealy.

December.

G. E. Power.   W. E. Hacon.   R. A. Lithgow.
H. M. Langdale.   F. J. De Lisle. G. J. Llewellin.
M. S. Duke.   N. B. Elliot.   C. E. Whitington.
G. W. Graham.   Josh. Kindon.   E. G. Younger.

GUY'S HOSPITAL MEDALLISTS AND PRIZEMEN, 1869-70.

EXAMINATION OF STUDENTS IN MEDICINE AND ITS
ALLIED SCIENCES, AUGUST 3rd, 1870.

The Treasurer's Gold Medal for Clinical Medicine.
A. K. Newman, Lee, Kent.

The Treasurer's Gold Medal for Clinical Surgery.
W. F. R. Burgess, Bethnal Green, London.

Third Year's Students.

PRIZES.

A. Cooper, York, First Prize, £40.
G. D. Deeping, Newark, Second Prize £35.
A. K. Newman, Lee, Kent, Honorary Certificate.

Second Year's Students.

J. Clague, Isle of Man, First Prize, £35.
B. H. Williams, Haverfordwest, Second Prize, £30.
G. Turner, Portsea, Honorary Certificate.
H. S. Branfoot, Lymm, Cheshire, Honorary Certificate.
W. E. Hacon, Hackney, Honorary Certificate.

First Year's Students.

G. F. Masterman, Croydon, First Prize, £30.

Equal { F. A. Mahomed, Brighton, £17 17s.[1]
T. T. Paul, Swaffham, Norfolk, £17 17s.[1]

ENTRANCE EXAMINATION IN CLASSICS, MATHEMATICS, &c.

October, 1869.

J. A. Rigby, Preston, Lancashire, First Prize, £25.
W. A. Simmonds, Strood, Kent, Second Prize, £20.
R. C. Gibb, Jamaica, Third Prize, £15.
M. S. Todd, Jersey, Honorary Certificate.

PUPILS' PHYSICAL SOCIETY, 1869-70.

The Society's First Prize of £10 was awarded to Mr. F. G. Larkin, for his Paper on " Nephrotomy."

The Second Prize of £5 to Mr. G. F. Masterman, for his Paper on "Tropical Diseases."

A Third Prize of £5 to Mr. Arthur Cooper, for his Essay on " Temperature and Reports of Disease."

An extra Prize of £5 to Mr. G. D. Deeping, for a Paper on the " Diagnostic Value of the Countenance in Disease."

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CLINICAL APPOINTMENTS HELD IN THE YEAR 1870.

RESIDENT HOUSE SURGEONS.

Charles Higgens.	Frederic Durham.	W. Egerton Saunders.
Wm. Prior Mallam.	Alfred Ashby.	Charles Jas. Oldham.

RESIDENT HOUSE PHYSICIANS.

Henry Gould.	R. C. Lucas.
J. A. Sharp.	John de Liefde, M.D.

RESIDENT OBSTETRIC CLERKS.

P. T. Scott.	W. E. Saunders.	H. G. Turner.
C. D. Maynard.	S. F. Murphy.	A. R. Manby.
F. M. Robertson.	C. J. Oldham.	C. E. S. Perkins.
G. Abbott.	F. S. Tuck.	Alf. Gillingham.

SURGEON'S DRESSERS.

J. Jolliffe.	M. Harris.	A. E. Kynaston.
C. E. Aikin.	C. E. S. Perkins.	J. E. Burroughs.
J. H. Ewart.	A. W. Smith, M.B.	W.T.P. Douglas, B.A.,
W. H. Jalland.	Wilson Eager.	M.B.
A. M. Branfoot.	William Stanger.	H. E. Dixon.
F. J. Carey, M.A. Lond.	F. G. Larkin.	J. T. Ingoldby.
H. E. Southee.	E. B. Evans.	Wm. Beatson.
W. J. Johnson.	W. A. E. Waller.	W. P. Yates.
	T. W. Lacey.	

[1] A portion presented by one of the Governors.

CLINICAL CLERKS.

Alf. Ashby.	Wm. Stanger.	E. H. Steele.
S. F. Murphy.	W. E. Saunders.	W. L'H. Blenkarne.
A. R. Manby.	Wm. Greaves.	W. A. E. Waller.
T. W. Lacey.	Alfred Gillingham.	W. F. R. Burgess, M.B.
M. Harris.	John Jolliffe.	W. H. Jalland.
G. D. Deeping.	F. Coomber.	Thomas Jones.

DRESSERS IN THE EYE-WARDS.

T. W. Lacey.	P. T. Scott.	W. Eager.
Richard Stephens.	Wm. Greaves.	W. T. P. Douglas, B.A.
Alfred Gillingham.	W. P. Mallam.	M.B.
J. E. B. Burroughs.	A. K. Newman.	A. Ashby.
	J. H. Ewart.	

POST-MORTEM CLERKS.

Benjamin Tubb.	H. G. Button.	W. F. Hacon.
G. J. W. Pinching.	W. P. Nesbitt.	H. E. Southee.
W. G. Nash.	D. Duke.	A. Matcham.
G. C. Hall.	J. Marshall.	G. F. Masterman.
H. W. Stuart.	B. P. Morison.	T. H. Fagg.
R. J. Pye-Smith.	Samuel Hosegood.	T. B. H. Clunn.
H. A. Latimer.	Wm. Butler.	W. Perkins.

ASSISTANT-SURGEON'S DRESSERS AND DRESSERS IN THE SURGERY.

W. T. Law.	F. G. Passmore.	H. G. Biggs.
T. K. Clarke, M.A.	Wm. Russell.	F. T. Maisey.
H. J. W. Barrow.	H. C. Turner.	C. A. G. Barrow.
F. Seymour.	E. G. Younger.	Josh. Kindon.
H. A. Latimer.	W. C. Blaker.	A. H. Evans.
F. J. Carey, M.A.	G. J. W. Pinching.	G. A. Coombe.
D. W. Duke.	John Marshall.	H. H. J. Nicholls.
F. C Turner, M.A.	T. A. Crackle.	H. B. Bailey,
C. S. Ticehurst.	A. A. Beardsley.	H. E. Southee.
T. D. Harries.	Edwin Tipple.	J. N. Kiddle.
G. M. Roberts.	B. P. Morison.	A. M. Branfoot.
B. H. Williams.	D. Duke.	F. D. Grayson.
J. L'Oste Brown.	J. T. Ingoldby.	James Reed.
Frank Wacher.	T. G. Lidbetter.	G. Turner.
R. H. Hughes, B.A.	A. F. Trenerry.	E. A. Burgess.
W. Perkins.	F. E. Barrow.	G. A. Dundas.
A. Cooper.	W. J. Johnson.	G. J. Llewellin.
R. J. Pye-Smith.	T. B. H. Clunn.	H. G. Cartwright.
R. Paramore.	T. J. Dixon.	T. Jones.
G. D. Deeping.	A. H. Haines.	M. Harris.

DENTAL SURGEON'S DRESSERS.

J. P. Allwood.	F. G. Larkin.	F. H. Clarke.
T. Jones.	J. T. Ingoldby.	W. F. R. Burgess.
Edw. Bovill.	Alfred Matcham.	A. S. Armstrong.
Robert Dunstan.	G. J. Congdon.	R. Galpin.

AURAL SURGEON'S DRESSERS.

D. W. Duke.	A. E. Kessen.	T. R. Edmundson.
A. K. Newman.	F. H. Clarke.	R. Galpin.
T. W. Jackson.	J. W. Scott.	J. Marshall.
	D. Price.	

MEDICAL WARD CLERKS.

Wm. Russell.
Samuel Walker.
F. E. Barrow.
J. P. Allwood.
A. R. Betts.
G. J. W. Pinching.
G. Deeping.
H. J. W. Barrow.
A. H. Evans.
F. H. Clarke.
D. W. C. Hood.
T. H. Fagg.
C. E. Whitington.
John Jolliffe.
Richard Galpin.
W. P. Nesbitt.
A. R. Newman.

Thomas Jones.
T. A. Crackle.
G. C. Hall.
J. R. Pye-Smith.
T. B. H. Clunn.
H. E. Southee.
N. A. R. Harrison.
A. H. Haines.
F. J. de Lisle.
Edw. Bovill.
John Marshall.
F. E. Newington.
H. D. Palmer.
J. T. Ingoldby.
D. Duke.
H. B. Bailey.
H. A. Latimer.

Francis Seymour.
H. C. Turner.
J. L. Morley.
Alfred Matcham.
A. M. Branfoot.
Arthur Cooper.
E. J. Domville.
Thomas Pink.
T. G. Lidbetter.
W. T. Law.
B. P. Morison.
J. N. Kiddle.
C. S. Ticehurst.
S. Allen.
T. D. Harries.
H. R. Ker.
G. F. Masterman.

ASSISTANT-PHYSICIAN'S CLERKS.

W. F. R. Burgess.
D. Duke.
Francis Seymour.
A. H. Evans.
F. G. Passmore.
John Jolliffe.
F. G. Barrow.
E. F. Thomas.

Thomas Jones.
G. H. Cable.
R. J. Pye-Smith.
H. G. Peacock.
W. Perkins.
T. H. Fagg.
Samuel Hosegood.
F. J Carey, M.A.
W. T. Law.

F. J. de Lisle.
C. Batchelor.
John Marshall.
W. P. Nesbitt.
W. J. Johnson.
Wm. Rendall.
Alfred Matcham.
B. H. Williams.

SURGICAL WARD CLERKS.

G. C. Hall.
J. Clague.
C. S. Robson.
T. W. D. Tudge.
S. Allen.
H. G. Biggs.
E. C. Rogers.
Henry Ashby.
S. T. A. Dunn.
Richard Coom.
E. G. Younger.
H. S. Branfoot.
C. C. Godding.
S. W. Spark.
W. H. A. Jacobson, B.A.
C. F. Bryan.
C. D. Fenn.
Ernest Field.
H. Evans.
Edmund Fyson.
G. J. Llewellin.
P. Furnivall.
J. L. Morley.
T. G. Bettany.
R. W. Murphy.
G. J. Sealey.

G. F. Masterman.
F. A. Mahomed.
C. B. Elliott.
J. P. Bevan.
Charles Jackson.
G. E. Power.
W. A. Garrard.
R. W. F. Carter.
W. G. G. Parker.
W. E. Bennett.
J. C. Irving.
R. S. Mutch.
H. G. Cartwright.
F. T. Atkins.
T. D. Harries.
W. Wallis.
D. M. B. Wheeler.
Charles Knott.
J. Rindon.
G. A. Slack.
H. R. McKay.
E. M. Boddy.
B. H. Williams.
John Marshall.
N. B. Elliot.
B. P. Alderman.
Henry Hetley.

W. O. Jennings.
W. W. Pinching.
C. E. Oldman, B.A.
Thomas Eastes.
E. T. Crouch.
G. H. Percival.
R. M. Talbot.
W. A. Simmonds.
A. P. Kingcombe.
Henry Langdale.
W. H. Spurgin.
Richard Galabin, M.A
F. E. Newington.
D. Price.
W. C. Hansell.
Alexander Wilcocks.
H. Clyma
J. S. Fitkin.
H. J. Bird.
T. R. Edmundson.
T. C. Jones.
M. S. Todd.
J. A. Lewis.
F. G. A. Rogers.
A. M. French.
T. Evans.

GUY'S HOSPITAL.

THE SESSION OF 1870-71 COMMENCED ON THE 1st OCTOBER.
The INTRODUCTORY ADDRESS was given by
CHARLES BADER, ESQ.,

On Saturday, the First of October, after which the Prizes for the past Session were distributed.

MEDICAL OFFICERS.

Physicians.
G. OWEN REES, M.D., F.R.S.; S. O. HABERSHON, M.D.; S. WILKS, M.D., F.R.S.

Assistant-Physicians.
F. W. PAVY, M.D., F.R.S.; W. MOXON, M.D.; C. HILTON FAGGE, M.D.

Consulting Surgeon.—J. HILTON, ESQ., F.R.S.

Surgeons.
E. COOK, ESQ.; J. BIRKETT, ESQ.; A. POLAND, ESQ.; J. COOPER FORSTER, ESQ.

Assistant Surgeons.
THOMAS BRYANT, ESQ.; ARTHUR DURHAM, ESQ.; H. G. HOWSE, M.S.

Consulting Obstetric Physician.—HENRY OLDHAM, M.D.

Obstetric Physician.—J. BRAXTON HICKS, M.D., F.R.S.

Assistant Obstetric Physician. — J. J. PHILLIPS, M.D.

Ophthalmic Surgeon.—A. POLAND, ESQ.

Assistant Ophthalmic Surgeon.—C. BADER, ESQ.

Dental Surgeon.—J. SALTER, ESQ., F.R.S.

Assistant Dental Surgeon.—HENRY MOON, ESQ.

Aural Surgeon.—JAMES HINTON, ESQ.

Medical Registrar.—P. H. PYE-SMITH, M.D.

Surgical Registrar.—RICHARD RENDLE, ESQ.

Apothecary.—JAMES STOCKER, ESQ.

WINTER COURSES.
LECTURES.

Medicine.—Dr. OWEN REES and Dr. WILKS,
Mondays, Wednesdays, and *Fridays*, at Three.

Clinical Medicine.—Dr. OWEN REES, Dr. HABERSHON, and Dr. WILKS,
Saturdays, at Half-past One.

Surgery.—Mr. BIRKETT and Mr. COOPER FORSTER,
Tuesdays and *Thursdays*, at Half-past Three, *Fridays*, at Half-past Ten.

Clinical Surgery.—Mr. COOK, Mr. BIRKETT, Mr. POLAND, and Mr. FORSTER,
Fridays, at Half-past One.

Anatomy, Descriptive and Surgical.—Mr. DURHAM,
Tuesdays, Wednesdays, Thursdays, and *Fridays*, at Nine.

Physiology and General Anatomy.—Dr. PAVY,
Mondays, Wednesdays, and *Fridays*, at a Quarter past Four.

Clinical Lectures on Midwifery and Diseases of Women.—Dr. HICKS & Dr. PHILLIPS.
Wednesdays, at Half-past One.

Chemistry.—Dr. DEBUS and Dr. STEVENSON,
Tuesdays, Thursdays, and *Saturdays*, at Eleven.

Experimental Philosophy.—Dr. STEVENSON and Mr. DAVIES-COLLEY,
Wednesdays, at Twelve.

DEMONSTRATIONS.

Anatomy.—Mr. HOWSE and Mr. DAVIES-COLLEY, *Daily.*
Assistant Demonstrators.—Mr. FREDERICK TAYLOR and Mr. B. N. DALTON.
Morbid Anatomy.—Dr. MOXON, *Daily,* at Half-past Two.
Cutaneous Diseases.—Dr. FAGGE, *Tuesdays,* at Twelve.
Microscope.—Dr. PYE-SMITH, *Wednesdays* and *Fridays,* at One.

Lying-in-Charity.—Dr. J. BRAXTON HICKS and Dr. PHILLIPS.
Curator of the Museum.—Dr. MOXON.

SUMMER COURSES.
LECTURES.

Materia Medica and Therapeutics—Dr. HABERSHON,
Tuesdays, Thursdays, and *Fridays,* at Three.
Clinical Medicine.—Dr. PAVY, Dr. MOXON, and Dr. FAGGE.
Wednesdays, at Half-past One.
Clinical Surgery.—Mr. BRYANT, Mr. DURHAM, and Mr. HOWSE,
Fridays, at Half-past One.
Midwifery.—Dr. BRAXTON HICKS,
Tuesdays, Wednesdays, Thursdays, and *Fridays,* at a Quarter to Nine.
Medical Jurisprudence.—Dr. ALFRED TAYLOR,
Tuesdays, Thursdays, and *Saturdays,* at Ten.
Pathology.—Dr. MOXON, *Saturdays,* at Nine.
Ophthalmic Surgery.—Mr. POLAND and Mr. BADER,
Mondays, at a Quarter to Nine.
Comparative Anatomy and Zoology.—Dr. PYE-SMITH,
Mondays and *Fridays,* at a Quarter to One.
Hygiene.—Dr. HILTON FAGGE.
Botany.—Mr. JOHNSON,
Tuesdays, Thursdays, and *Saturdays,* at Half-past Eleven.
Vaccination.—Dr. PHILLIPS.

DEMONSTRATIONS.

Practical Chemistry.—Dr. DEBUS,
Mondays, Wednesdays, and *Fridays,* Ten to One.
Operative and Manipulative Surgery.—Mr. BRYANT,
Wednesdays, at Three.
Microscope.—Mr. HOWSE, *Tuesdays* and *Fridays,* at Ten.

The Hospital, when the new wards shall have been opened, early in the spring, will contain 720 beds. Special Clinical Instruction is given by the Physicians in Wards set apart for the most interesting cases.

Clinical Lectures—Medicine, Surgery, and Midwifery—Weekly.
Lying-in-Charity—Number of Cases attended annually, about 2000.
Diseases of Women—26 Beds. Ophthalmic cases—30 Beds.
Museum of Anatomy, Pathology, and Comparative Anatomy—Curator, W. Moxon, M.D.—contains 10,000 specimens, 4000 drawings and diagrams, an unique collection of Anatomical Models, and a series of 400 Models of Skin Diseases.

Gentlemen desirous of becoming Students must give satisfactory testimony as to their education and conduct. Fees—£40 for the first year, £40 for the second, and £10 for every succeeding year of attendance; or £100 in one payment entitles a Student to a perpetual ticket.

Dressers, Clinical Clerks, Ward Clerks, Obstetric Residents and Dressers in the Eye Wards, are selected from the Students according to merit.

The House Surgeons and House Physicians have rooms and commons in the Hospital.

Six Scholarships, varying in value from £25 to £40 each, are awarded at the close of each Summer Session for general proficiency.

Two Gold Medals are given by the Treasurer—one in Clinical Medicine, and one in Clinical Surgery.

A Voluntary Examination takes place at entrance, in Elementary Classics and Mathematics. The first three candidates receive respectively £25, £20, and £15.

Mr. Stocker will give any further information that may be required.